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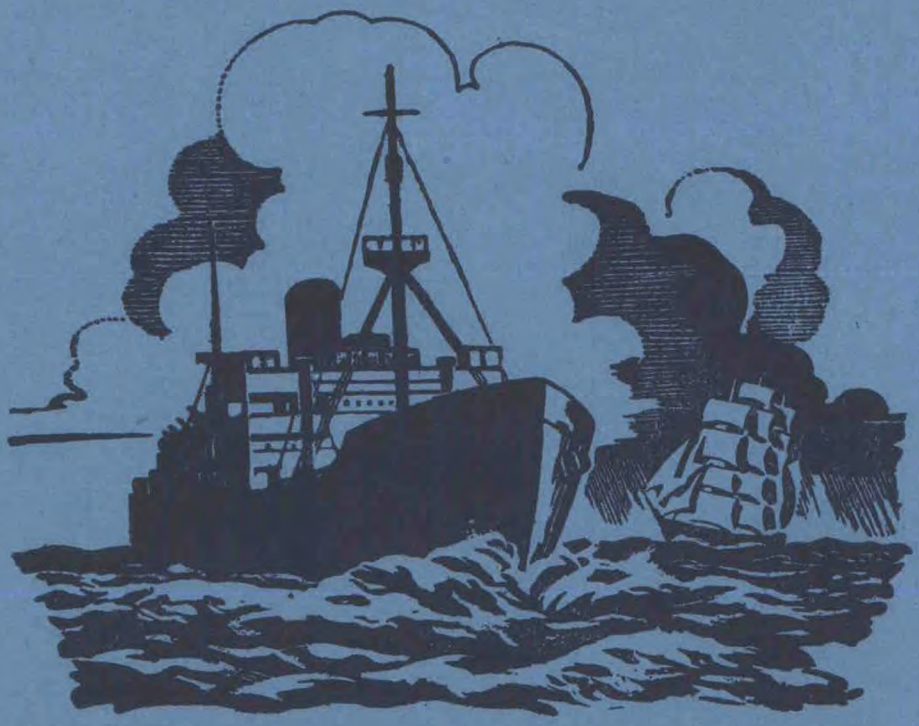
The Marine Observer

A quarterly journal of Maritime Meteorology



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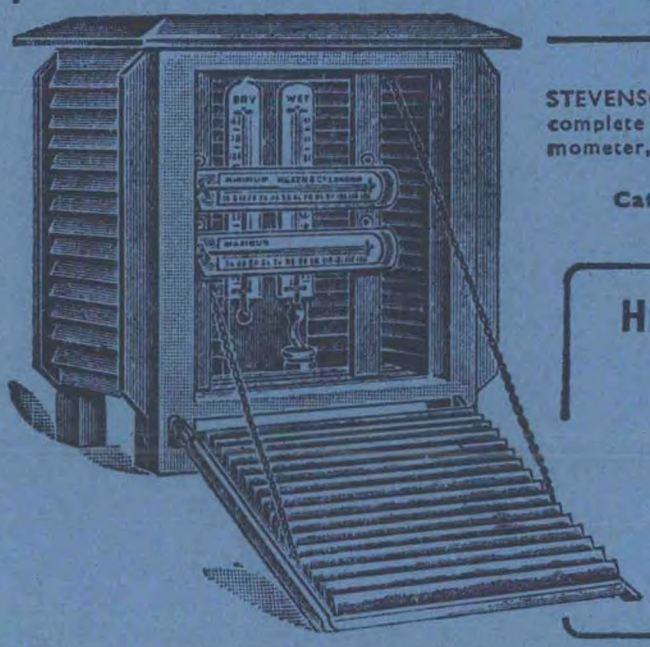

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THE MARINE OBSERVER

A QUARTERLY JOURNAL OF MARITIME METEOROLOGY PREPARED BY THE MARINE BRANCH OF THE METEOROLOGICAL OFFICE

VOL. XXIII No. 162 OCTOBER, 1953

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Letters to the editor, and books for review, should be sent to The Editor, "The Marine Observer," Meteorological Office, Headstone Drive, Harrow, Middlesex

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FAREWELL MESSAGE FROM SIR NELSON JOHNSON

When I took over the Directorship of the Meteorological Office fifteen years ago I expressed my confidence in the organisation which had been established by which British merchant ships acted as the medium for collecting reliable meteorological observations from all the oceans of the globe. I am glad to say that my confidence has been justified by time and that the organisation is now larger and stronger in spite of the dislocating effects of six years of war. It is, moreover, worth noting that the observations collected initially for the benefit of merchant ships in time of peace have proved of very great value to the country in time of war.

I wish to express my gratitude to the masters and officers of all ships which have co-operated in making the organisation so effective, and to assure them that I look forward with confidence to their continued collaboration in the future.

I would like to take this occasion to pay tribute to Commander Frankcom, Marine Superintendent of the Meteorological Office, and his staff for the zeal and energy which they have displayed in all matters concerning marine meteorology and for maintaining such cordial relations with the observing ships.

N. K. JOHNSON,
Director.

Editorial

A noteworthy meteorological centenary takes place this year. In August, 1853, the first International Meteorological Conference was held at Brussels, thanks to the inspiration of Lieutenant M. F. Maury of the U.S. Navy. Maury's name has often appeared in *The Marine Observer* and it is fitting that it should do so, because he can be rightly named the father of international meteorology. Long before the Brussels Conference, Maury had taken action on his own initiative in the United States to collect information from ships about the meteorology, the currents and indeed the natural history of the oceans. He managed to persuade hundreds of ships to make voluntary observations on his behalf, and was thereby able to prepare the first comprehensive charts on a world basis on which were depicted the climatology and surface currents of the oceans.

At the Brussels Conference all the prominent maritime countries were represented, and as a result of it they agreed to co-operate in encouraging the masters and officers of their merchant ships to provide meteorological information. As a direct result of this Conference the Meteorological Office came into being, as a Department of the Board of Trade, the first head of which was Admiral Fitzroy. The aeroplane had not then been invented, and bearing in mind the importance of maritime commerce in the " expanding " world, it was not perhaps surprising that it was a seaman, and the needs of seamen, which thus provided the impetus for international meteorology and indeed the organised study of meteorology at all.

Maury must have been a remarkable man; his book *Sailing Directions* was published in 1858 and written in a very learned manner, and shows that he had for his time a very advanced meteorological and oceanographical knowledge. The illustrations and maps in this book are beautifully produced and contain a wealth of detail. The fact that selected ships of the world are still carrying out the work instituted at Brussels in 1853 is perhaps a rather fitting memorial to the life and work of this great man. Maury was born in 1806 and went to sea in 1825 in the U.S. Navy; in 1831, as a lieutenant, he was in command of the sloop *Falmouth*, but in 1839 had to give up the sea as the result of an accident and spent the rest of his life ashore. He died in 1873.

The value of the Brussels Conference is shown by the fact that the ships of most maritime countries play their part in the present-day selected ships' scheme, and that there are today no less than 2,500 ships voluntarily making meteorological observations wherever their voyages take them. All these ships send radio weather messages to whatever countries require them, under the present guidance of the World Meteorological Organisation—truly, this is practical international co-operation.

There is little doubt that the masters and officers of British ships will continue to provide voluntarily, as they have done for 100 years, their quota of information about the meteorology of the oceans and thus help to build up our knowledge and assist the meteorologists to apply their science more effectively for the benefit of mankind in general. In this age of science and industrialisation and keen competition the application of meteorological knowledge to all human activities becomes increasingly important. Forecasting is after all only one side of meteorology—the applications of climatology are just as wide and important.

It is perhaps fitting that, following the Maritime Meteorological Conference inspired by a seaman, the first head of the Meteorological Office was himself a seaman. Fitzroy was not only a seaman but had a considerable scientific bent and had been, no doubt, considerably inspired by his contacts with Darwin when they sailed together aboard the *Beagle*. At a very early date Fitzroy instituted the first weather forecasts in this country, and the marine barometer used aboard British selected ships now is not far different from the instrument provided for British selected ships under Fitzroy.

Fitzroy died in 1865. The Meteorological Office was then separated from the Board of Trade, and in January, 1867, Mr. R. H. Scott was appointed Secretary. On his retirement, Mr. W. N. (afterwards Sir Napier) Shaw was made Director and he was succeeded in 1920 by Dr. G. C. (afterwards Sir George) Simpson.

As mentioned elsewhere in this journal, the Meteorological Office has now reached another milestone in its history in the retirement of Sir Nelson Johnson, who has been our Director since 1938. Professor Sutton is now Director. He is following in the steps of illustrious forebears, and we feel that all readers of *The Marine Observer* will join us in wishing him success and happiness in his important task.

RETIREMENT OF SIR NELSON K. JOHNSON, K.C.B., D.Sc.

By the time this number of *The Marine Observer* reaches its readers Sir Nelson Johnson, who has been Director of the Meteorological Office since September, 1938, will have retired. Throughout the period of his office Sir Nelson showed great interest in the activities of British selected ships, as shown by the fact that he instituted an annual special award for voluntary observers who had done consistently good work over a long period, and he also extended the scope of Excellent Awards, which are made annually to those observers who have done the best voluntary meteorological work during the year. Sir Nelson liked to present the special awards personally, and on the occasions when he did so his address to those present always brought forward some interesting and unexpected point of view concerning the work of the voluntary observer at sea. He was very aware of the great value of this work for world meteorology and of the ready assistance thus provided by the shipping industry.

Sir Nelson was an admirable chief with whom to work—always approachable and courteous and always ready with good advice.

Sir Nelson was born at Canterbury. He graduated from London University (Royal College of Science) and served in the 1914–18 War as a pilot in the R.F.C. In 1919 he joined the Meteorological Office and from 1921–28 he was engaged on chemical defence research at Porton. During this period he carried out considerable research afloat in H.M. ships. From 1928–38 he was in the service of the War Office and in September, 1938, he took up his appointment as Director

of the Meteorological Office on the retirement of Sir George Simpson. Sir Nelson's responsibilities as Director of the Meteorological Office throughout the 1939–45 War were very onerous, and his service was recognised by the award of a K.C.B. In 1946 Sir Nelson was elected President of the International Meteorological Organisation, a post he filled with the highest distinction. He presided over the Conference of Directors in 1947 which established the Convention of the World Meteorological Organisation and which, incidentally, produced the new " Universal " meteorological code. In April, 1951, Sir Nelson became, for the period of its first session held in Paris, the first President of the World Meteorological Organisation. Quiet and unassuming in manner, he had a fine grasp of international affairs and he presided over difficult conferences with tact and firmness. In earlier days he was a keen mountaineer; his present hobbies include the study and collection of antique clocks, in which he is an expert. He is married and has a son and daughter; his home is at Eastbourne.

We wish Sir Nelson many years of happiness and good health in his retirement.

THE NEW DIRECTOR OF THE METEOROLOGICAL OFFICE

Professor O. G. Sutton, Dean and Bashforth Professor of Mathematical Physics in the Royal Military College of Science, succeeds Sir Nelson Johnson as Director of the Meteorological Office. Professor Sutton is known throughout the meteorological world as an expert in the dynamics of the lower atmosphere. He graduated in the University of Wales and later in the University of Oxford, and he joined the Meteorological Office in 1928. He was working at Porton on chemical defence, especially its meteorological aspects, from 1929 to 1943, and was then appointed Superintendent of tank armament research. In 1945 he transferred to the Radar Research and Development Establishment as Chief Superintendent, and in 1947 took up his appointment in the Royal Military College of Science. He was elected a Fellow of the Royal Society in 1949 and received the C.B.E. in 1950. Before his appointment as Director of the Meteorological Office he was already a representative of the Royal Society on the Meteorological Committee and a member of the Meteorological Research Committee. Apart from his many papers on meteorological subjects, Professor Sutton has recently published a comprehensive textbook entitled *Micrometeorology*.

RETIREMENT OF DR. A. H. R. GOLDIE

Dr. A. H. R. Goldie, Deputy Director of Research in the Meteorological Office, who had been for many years in overall charge of the Research, Instruments, Climatology and Marine Branches of the Meteorological Office, retired on 4th May, 1953. Dr. Goldie was born in Angus and studied at St. Andrews and Cambridge Universities. He joined the Meteorological Office in 1913 and served throughout the First World War in the Meteorological Section of the Royal Engineers. From 1924–38 Dr. Goldie was in charge of the Meteorological Office in Edinburgh, and during that period he carried out much research work on such subjects as magnetic storms, wind structure of depressions and the variation of rainfall. Dr. Goldie was placed in charge of the Research, Instruments, Climatological and Marine Branches of the Office in 1939, and moved with these branches to Stonehouse, Gloucestershire, for the war period. At the end of the war, when these branches were moved to Harrow, Dr. Goldie established his office in London. In 1951 he was awarded a C.B.E. in recognition of his services to meteorology.

Dr. Goldie always was an admirable colleague with whom to work and always showed great interest in all aspects of maritime meteorology, and by his retirement the Marine Branch has lost a good friend. We wish him every happiness for the future.

SPECIAL LONG-SERVICE AWARDS

Each year since 1948 the Director of the Meteorological Office has made a special award to four voluntary marine observers whose long and meritorious work at sea on behalf of the Meteorological Office is considered as deserving special recognition. Each officer who qualifies for this award has carried out a minimum of 15 years' service as a voluntary observer and considerable care is taken to check the records and ensure that the award is made fairly. This year the Director is pleased to make the award to the following captains.

CAPTAIN E. T. N. LAWREY (Port Line Ltd.). First commenced to observe in 1920, since when he has submitted 38 logbooks, nearly 58% of which have been classed excellent.

CAPTAIN J. G. LEWIS, O.B.E. (Port Line Ltd.). Since he started observing in 1923 we have received 25 logbooks from him of which just over 58% have been classed excellent.

CAPTAIN E. E. ROSWELL (Port Line Ltd.). A voluntary observer since 1923. Of 25 logbooks received from him 76% have been classed excellent.

CAPTAIN A. E. WILLIAMS (New Zealand Shipping Co.). His first logbook was received in 1916, since when he has submitted 23 logbooks of which 64% have been classed excellent.

The award will, as in past years, be in the form of a suitably inscribed barograph. We congratulate these captains on the recognition of their voluntary work over many years. They will be personally notified of the award and of the arrangements which will be made for the presentation.

SOUTH AFRICAN WEATHER BUREAU

Excellent awards for ships

We have received a letter from Dr. T. Schumann, the Director of the South African Weather Bureau, an extract from which is as follows:

" Framed pictures of typical South African scenery, with suitably engraved plates, have been presented to the following British selected ships in appreciation of their services to South African meteorology during the year 1951: *Athenic, Athlone Castle, Balaena, Biscoe, City of Paris, Dominion Monarch, Roxburgh Castle, Southern Collins, Thule, Umzinto.* Excellent awards were also made to the following ships which were not selected ships: *British Reliance, Calabar, Neaera, Newcombia, Stanmore.*

Year by year there has been a steady improvement in the co-operation of ships sending radio weather messages to Met Pretoria, especially from the Antarctic Ocean during the whaling seasons. The presentation of Excellent Awards to these ships is but a small token of our appreciation. The value of the reports to forecasting and climatological research is beyond measure."

We should like to take this opportunity of congratulating the ships concerned for their good work.

INDIA METEOROLOGICAL DEPARTMENT

Excellent Awards for Ships

The Director of the India Meteorological Department has informed us that nine ships voluntarily co-operating with that department were selected in 1952 to receive " Excellent Awards " for their work during the year 1951–52. The awards take the form of a set of maximum and minimum thermometers, suitably inscribed.

Ship	Captains	Observing Officers	Radio Officers	Owners
Bharatjal	M. X. Fernandes J. A. Forster J. F. Morris J. S. Swan	M. A. Adam R. S. Gomez E. Gopalan V. L. Hunter I. A. Kazi A. K. Modak Y. A. Monia E. K. Mukaddam A. F. Shaikh	J. Carneiro M. B. Gupte P. M. Sundaram	The Bharat Line Ltd.
Havildar	A. B. Kelly P. W. Palmer	R. A. Barker J. Ducher Y. Kelsey R. MacMillan R. McAlister H. O. Piner C. J. Robinson	E. J. Cunningham A. B. Mackenzie	The Asiatic Steam Navigation Co.
Islami	J. W. Mountford H. J. Palmer	N. S. W. Dyson —. Greig I. Glem G. R. Kaka Z. N. Mirza A. M. Turnbull	J. F. Carty J. P. Couchman L. Smith	The Mogul Lines Ltd.
Jehangir	H. Morini	G. T. Edwards		The Mogul Lines Ltd.
Kampala	C. R. Polkinghorne F. A. Spenceley	—. Bates F. D. Beal J. D. Coxe W. P. Jones E. W. Joss —. Mellor —. Pudden R. Ralph F. Stokes A. L. Thomas P. Whitton	J. A. Heath A. Lemon A. Presswell A. Wake R. Whiting	British India Steam Navigation Co.
Khosrou	J. W. E. Cochrane B. McClenahan	K. Chelliah E. W. Richards R. C. Sethu R. J. Ward	J. P. Curran J. T. James A. Lemon J. Martlieu G. Smith P. Smith	The Mogul Lines Ltd.
Nadir	F. C. M. Mason	E. Colins J. Duchar J. Garman J. R. W. Lyram E. D. Robinson G. H. Wharton J. Woollam	M. Dore	The Asiatic Steam Navigation Co.
Nurani	J. Thompson	—. Bapty —. Hammond V. P. Stephenson W. A. Wickham	A. T. Shawcross	The Asiatic Steam Navigation Co.
Rajula	—. Jamieson H. M. MacDonald	—. Bennet —. Ford —. Griffiths V. A. H. Iles C. W. Jenkins —. Webb	—. Davis P. Henderson R. E. Stewart	British India Steam Navigation Co.

Besides the nine ships mentioned above, Capt. J. H. Curry of the British India Steam Navigation Co., Ltd., now commander of S.S. *Dara*, and Mr. G. T. Edwards, now retired and lately Second Officer of S.S. *Jehangir* of the Mogul Lines, Ltd., have been given individual awards in recognition of their consistently good weather work in the Indian waters for many years.

We should like to take this opportunity to congratulate the captains and officers concerned.

MARINE SUPERINTENDENT.

The Marine Observers' Log

October, November and December

The Marine Observers' Log is a quarterly record of the most unusual and significant observations made by mariners.

The observations are derived from the logbooks of marine observers and from individual manuscripts. Photographs or sketches are particularly desirable.

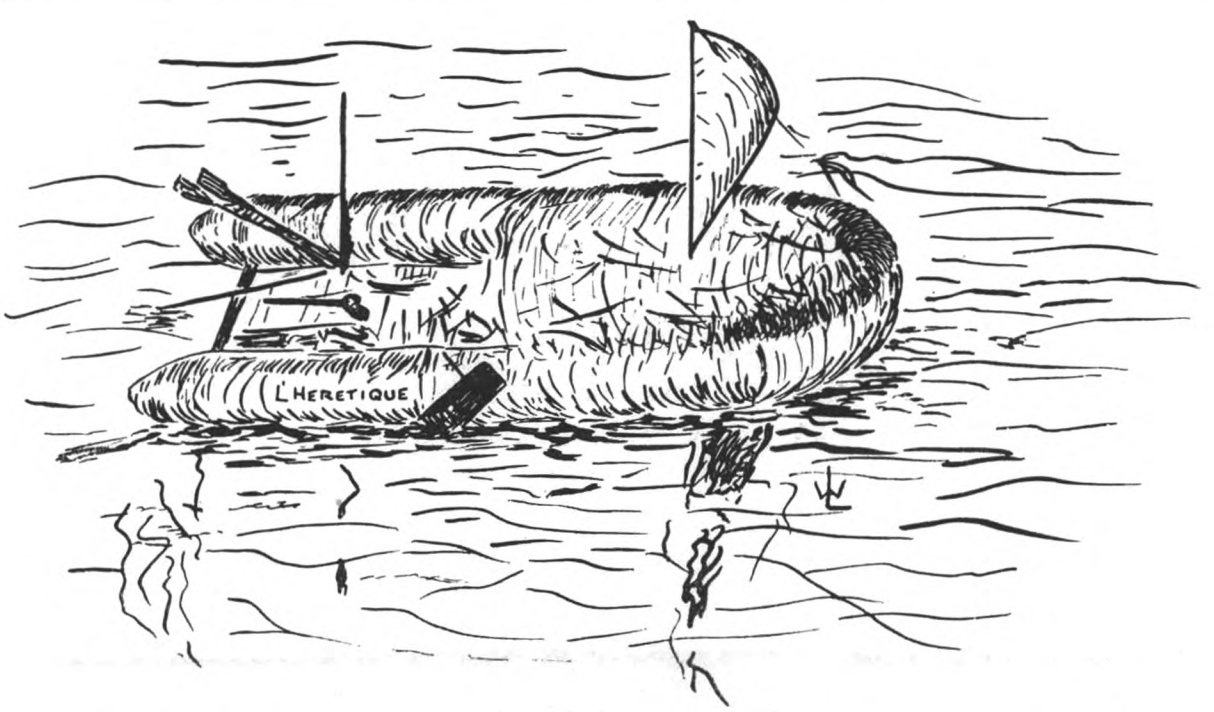
Responsibility for each observation rests with the contributor.

DR. BOMBARD AND HIS RAFT L'HERETIQUE

North Atlantic Ocean

S.S. *Arakaka.* Captain J. A. Carter. Liverpool to Georgetown.

10th December, 1952, 0750 A.T.S. (1103 G.M.T.). Encountered Dr. Bombard on his raft, which was sighted from a distance of 3½ miles, the weather being fine and clear, with a light variable breeze and a rippled sea with low swell.



Dr. Bombard, who was on an experimental raft voyage across the Atlantic, was in good health and spirits, and boarded the ship at 0841 A.T.S. His latitude was practically correct but longitude was out owing to his watch being 6 min in error, which he checked by our chronometer. Dr. Bombard left Nice on 25th May.

calling at Balearic Islands, Tangier, Casablanca and Canary Islands. He left Las Palmas on 20th October, so at the time of meeting he was 51 days at sea. Dr. Bombard previously sighted one ship but had not been sighted himself. Since leaving Las Palmas Dr. Bombard covered 2,056 miles, making about 40 miles a day.

On board S.S. *Arakaka* Dr. Bombard was informed of the correct position, given a weather forecast and was supplied with emergency water, a dry battery for his radio and a *Nautical Almanac* for 1953. The Captain also presented him with a British ensign as he specially asked for it. At 0935 A.T.S. Dr. Bombard left S.S. *Arakaka* with best wishes of all on board, and the ship resumed voyage, dipping her ensign and giving three blasts on the whistle in farewell to Dr. Bombard. A radio message was sent to Dr. Bombard's wife in Boulogne and to the B.B.C.

During the conversation Dr. Bombard mentioned the lack of trade winds, which we also noticed, but we picked them up at noon of that day, and evidently Dr. Bombard benefited from them also as he made the last 590 miles to Barbados in 13 days.

Position of ship: 15° 38′N, 49° 50′W.

GOSSAMER THREADS

Off Dakar

S.S. *John Holt.* Captain F. Sherrington. Werri (Nigeria) to Dakar. Observer, the Master.

26th November, 1952. Whilst approaching Dakar in the morning, it was observed that during the previous night strands of gossamer-like white threads had formed on the wireless aerials and halyards. They were standing out at right-angles in the light morning breeze and varied in length from a few inches to 2 or 3 ft. Samples were obtained and preserved. At 0001 G.M.T.: air temp. 82°F, dew point 73°, sea temp. 86°. Course 360°, 11 kt.

Position of ship at 0001 G.M.T.: 12° 56′N, 17° 27′W.

Note. The above observation and sample were forwarded to the Natural History Museum, whose comments were as follows:

"The phenomenon of gossamer is well known and has been previously recorded in the rigging of ships. It is due to unusual weather conditions. In calm, sunny weather myriads of small spiders become extremely active, wandering about trailing their webs, crossing and recrossing and producing a tangled mass of webbing. This becomes dew-laden at night. The morning sun dries the dew and sets up gentle convection sufficient to raise the gossamer off the ground. This drifts in the light breeze for miles until it becomes entangled with an object."

LOCUSTS

Arabian Sea

S.S. *Empire Orwell.* Captain N. W. Smith. Colombo to Aden.

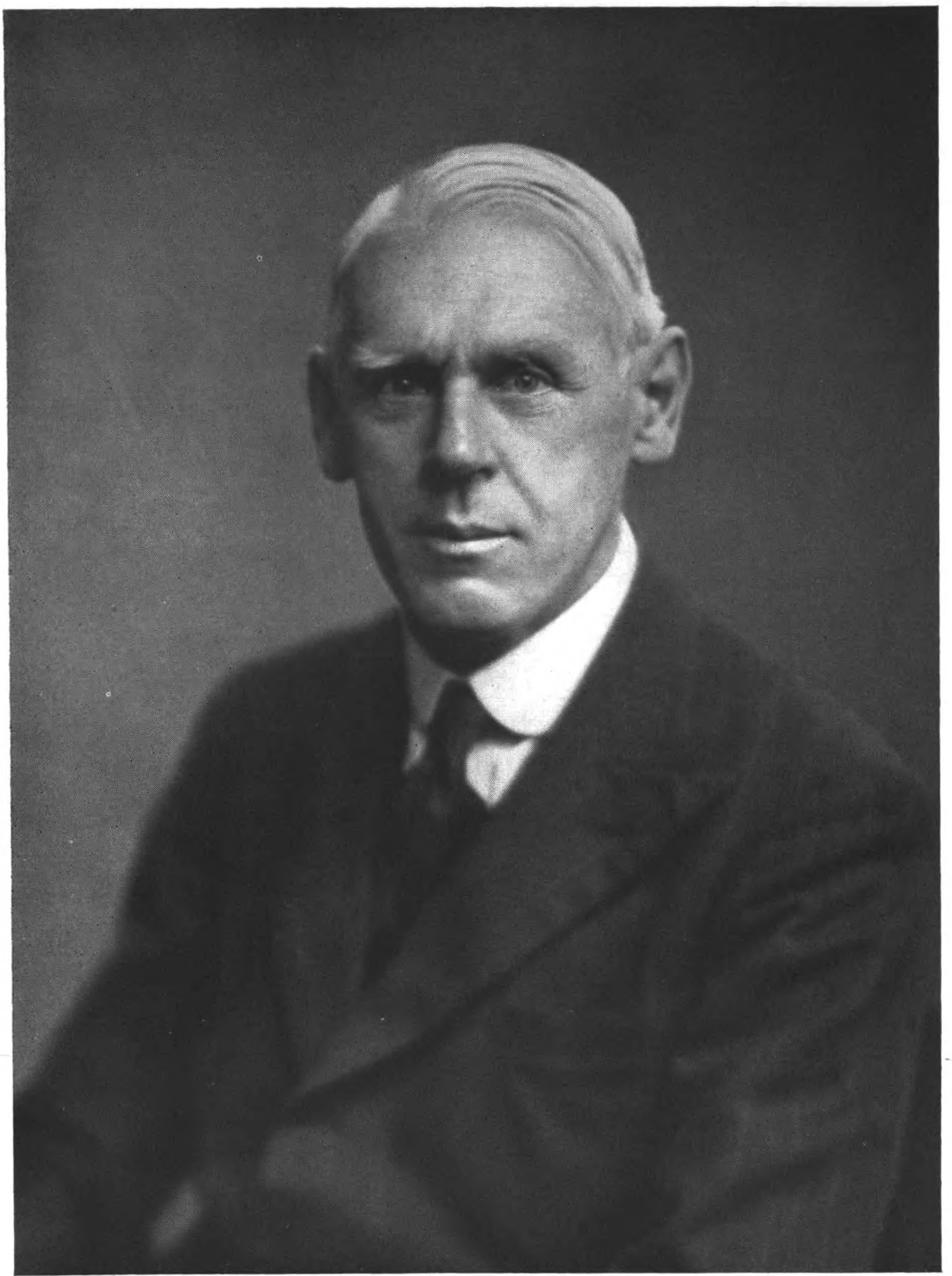
12th October, 1952, 0600 G.M.T. Locusts were observed to be landing on the vessel during the last 24 hours.

Position of ship: 08° 45′N, 69° 58′E.

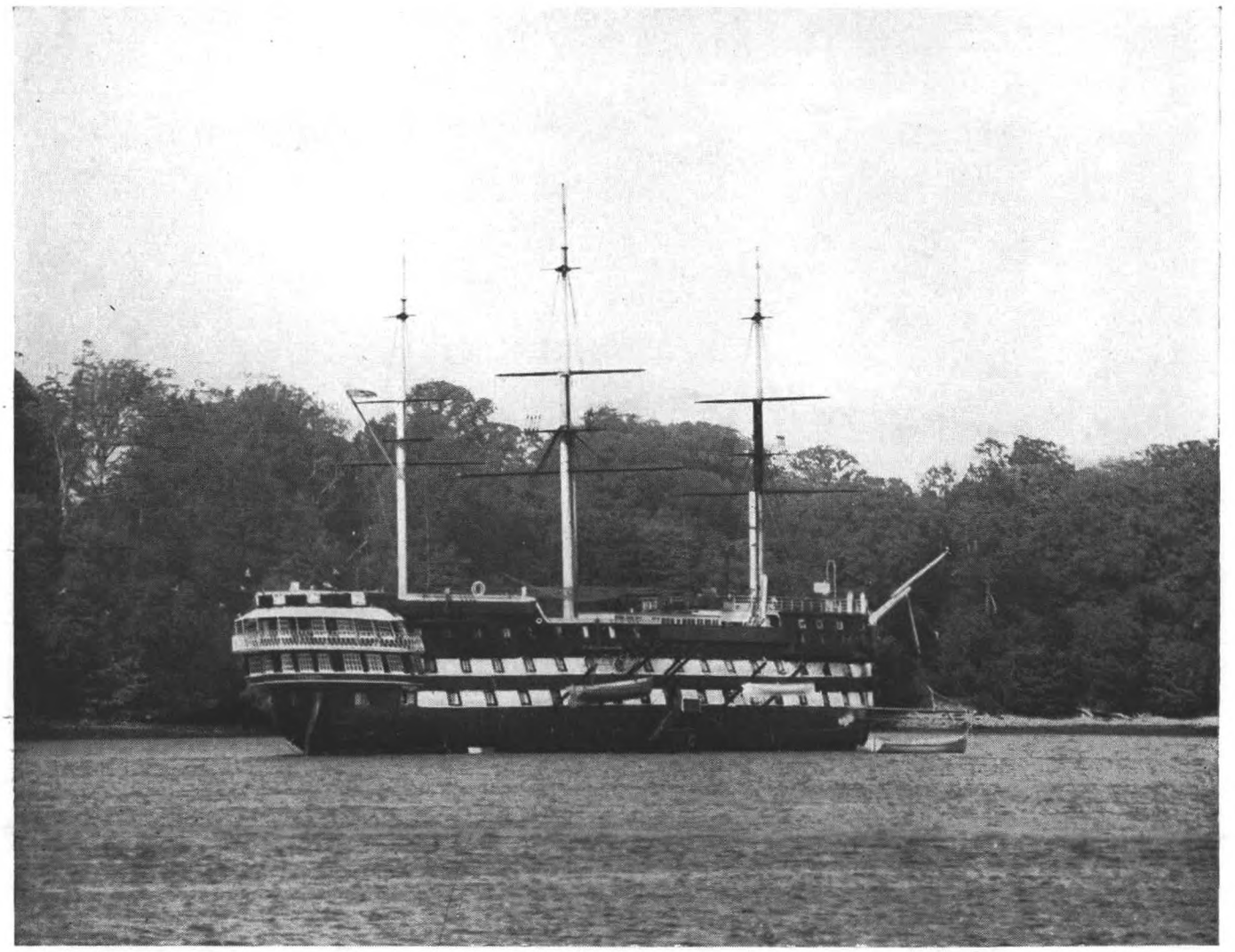
Note. This information was forwarded to the Director of the Anti-Locust Research Centre, whose comments were as follows:

"This is a valuable piece of information, as at that period locust swarms were reported leaving India and the appearance of immigrant swarms was noted on the southern coasts of Arabia and on the Somali Peninsula. We are greatly interested in analysing locust migrations in relation to weather dynamics, and large-scale movements of swarms from India during the last autumn provides good data, particularly when supplemented by reports of swarms crossing the sea."

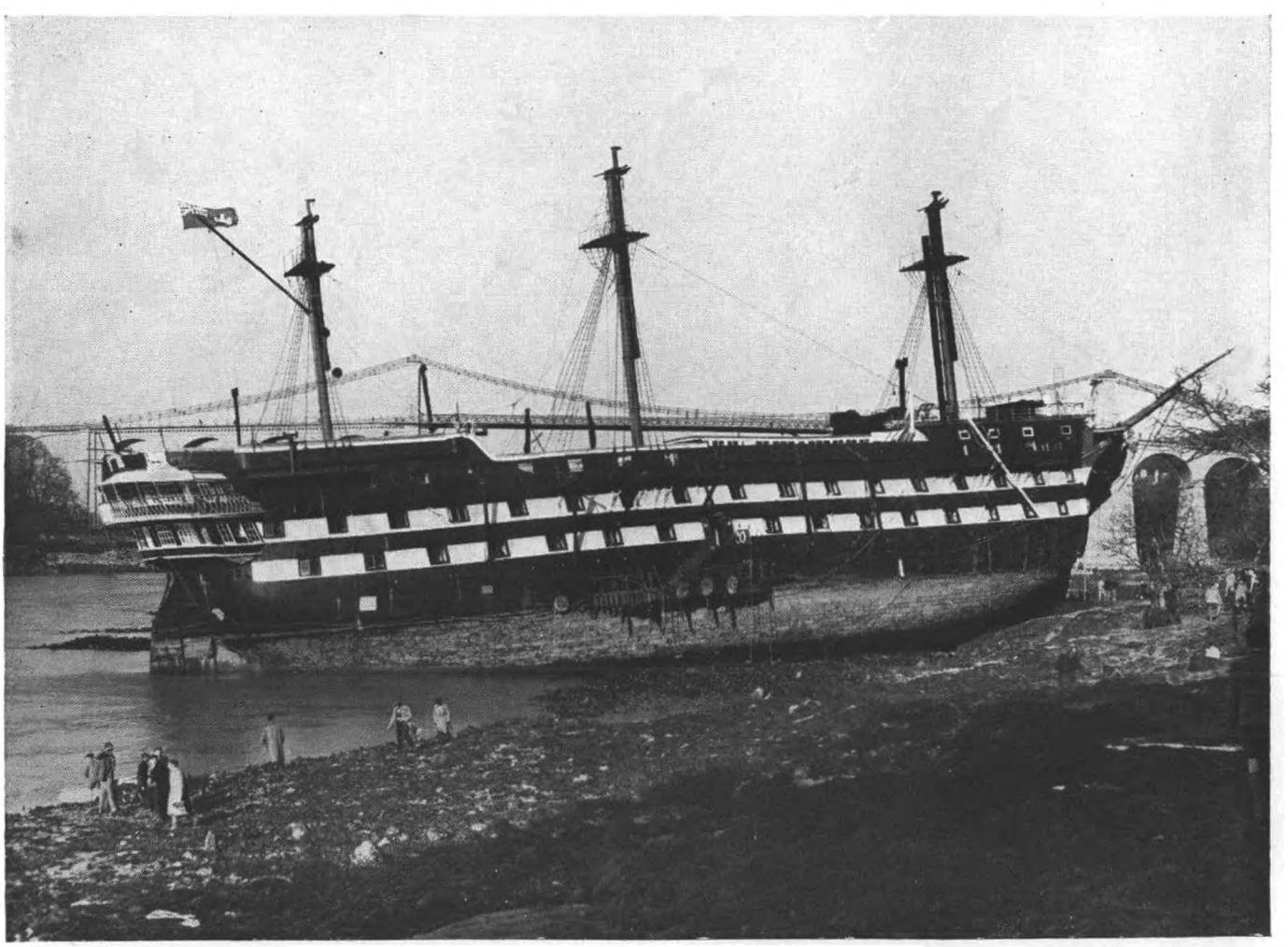
In the January, 1951, number of *The Marine Observer* we published a notice regarding observations of locust swarms by which ships which happen to encounter these pests might



Sir Nelson K. Johnson, Director of the Meteorological Office, 1938-53.



H.M.S. *Conway* at anchor in the Menai Straits.



H.M.S. *Conway* aground on 14th April, 1953.

THE MARINE OBSERVER Vol.XXIII, No.162, October, 1953.

ERRATA

The photographs facing pages 196 and 197 should appear facing pages 212 and 213 and those facing pages 212 and 213 should appear facing pages 196 and 197.

Meteorological Office
Her Majesty's Stationery Office

render valuable humanitarian service. Dr. Uvarov, the Director of the Anti-Locust Research Centre, has told us that this notice has resulted in several reports of this kind from ships, and at his request we reproduce it in this issue, on page 207.

SUBMARINE EARTHQUAKE

Eastern Mediterranean

S.S. *Sovac*. Captain H. W. Wilcox. Naples to Iskanderun. Observer, Mr. R. M. Johnston, 2nd Officer.

31st December, 1952, 1445 G.M.T. The vessel was felt to shudder violently for about 1 or 2 min. Investigation revealed no apparent cause on board so it was assumed to be an underwater disturbance of some kind. Similar disturbances recurred at 1515 G.M.T. and at 1655 G.M.T. Air temp. 65°F, sea 63°. Slight head sea and no swell. Course 098°(T), 10·2 kt.

Position of ship: 35° 30′N, 25° 36′E.

Note. This observation was referred to the seismologist at Kew Observatory, who commented as follows:

" Seismic disturbances were recorded here from 1453 to 1515 G.M.T. and from 1723 to 1800. According to reports subsequently received, these originated to the north of Crete, and it would seem that *Sovac* was steaming through these disturbances."

TIDAL WAVE

North Pacific Ocean

S.S. *Mossel Bay*. Captain A. N. Cabot. Muroran to Vancouver. Observer, the Master.

4th November, 1952, 0400 G.M.T. With the ship hove-to against a W'ly gale, a phenomenal wave was observed from the wheelhouse, height of eye 50 ft. The ship dropped into the trough, and as the wave went ahead of the ship it appeared to be level with the cross-trees, which are 36 ft over the foredeck.

At the time of observation the wind was WNW force 10, and the waves were periodically working up to a height of 50 ft. The phenomenal wave was judged to be about 70 ft high.

As the report of a tidal wave from an earthquake in the Pacific has just been received, it is wondered whether this could have some connection with the disturbance. Naturally, with such mountainous seas running it was impossible to disassociate this wave from the normal trend of the gale.

Position of ship: 46° 00′N, 171° 30′E.

Note. The above observation was sent to us by the Fisheries Research Board of Canada via the Canadian Meteorological Division. The Pacific Oceanographical Group of the Fisheries Research Board comment as follows:

" This large wave does indeed appear to correspond to the tidal wave generated in the Aleutians on 2nd-3rd November and observed in Hawaii on 5th-6th November. At first observation it was estimated as 100 ft in height with a speed of 33 kt. When seen from the *Mossel Bay* at 70 ft high its speed would be about 28 kt. At Hawaii its height was about 20 ft and speed 15 kt.

" Captain Cabot is to be congratulated on recording this observation."

DISCOLOURED WATER

Caribbean Sea

S.S. *Pinnacles*. Captain T. Lotvedt. Portland (Me.) to Puerto La Cruz. Observer, Mr. C. A. Bradshaw.

12th October, 1952, 1530 G.M.T. Vessel passed through an area of discoloured

---

Opposite—Cloud photographs from S.S. *Clan Davidson* (see page 202). *Top*—Figs. 1 and 2; *middle*—Figs. 3 and 4; *bottom*—Figs. 5 and 6.

The following table gives details of the weather conditions experienced on 29th–30th November, 1952:

Date (November)	Time (I.S.T.)	Wind	Sea and Swell	Barometer	Air Temp.
29th	midt.	NNE 7	Very rough N'ly sea	1004·3 falling	78°F
30th	0200	NNE 8	High and confused	997·6 falling	
	0800	NE'E 12	Precipitous	992·0 (lowest)	
	0900	ENE 12	Still higher and more confused	992·8 rising	
	1200	SE 10–11	High SE'ly sea and heavy swell	999·5 rising	
	1600		Moderating but still high	1004·0 rising	
	midt.	SE 5	Moderate		

Sky overcast throughout

Position of ship at 0200 (I.S.T.) on 30th November: 11° 15′N, 80° 56′E.

Note. This observation was sent to the Director, India Meteorological Department.

WATERSPOUT

North Atlantic Ocean

S.S. *Imperial Alberta.* Observer, Mr. J. A. Hunt.

15th October, 1952, 1735 G.M.T. Experienced very heavy rain shower lasting about 12 min, which reduced the visibility to nil. The rain cloud extended from horizon to horizon. During the period the wind shifted from SSE to SW force 4 to 6. The rain squall was followed closely by a small waterspout with a mushroom type cloud about 500 ft high which passed very close to the starboard side of the ship. Course 178°, 16·5 kt.

Position of ship: 36° 01′N, 68° 32′W.

Note. The above observation was sent to us by the Controller, Canadian Meteorological Division.

S.S. *San Leonardo.* Captain W. H. Lamb. New York to Punta Cardon. Observer, Mr. G. L. Munday, 2nd Officer.

19th December, 1952, 1820 G.M.T. An incomplete waterspout was observed from a distance of about $\frac{2}{3}$ mile. The funnel of the waterspout was seen descending from a large Cb (base about 1,000 ft) to about 300 ft above the sea. The sea was considerably agitated beneath the funnel, spray was being whirled round in an anticlockwise direction and thrown to a height of about 20 ft. Moisture in the funnel also appeared to be turning in an anticlockwise direction and ascending to the cloud base. Air temp. 75°F, sea temp. (engine room) 70°. Barometer (uncorrected aneroid) 30·31 in. Wind 315°, force 3. Slight drizzle. Height of waves, 2 ft.

Position of ship: 31° 12′N, 71° 04′W.

Caribbean Sea

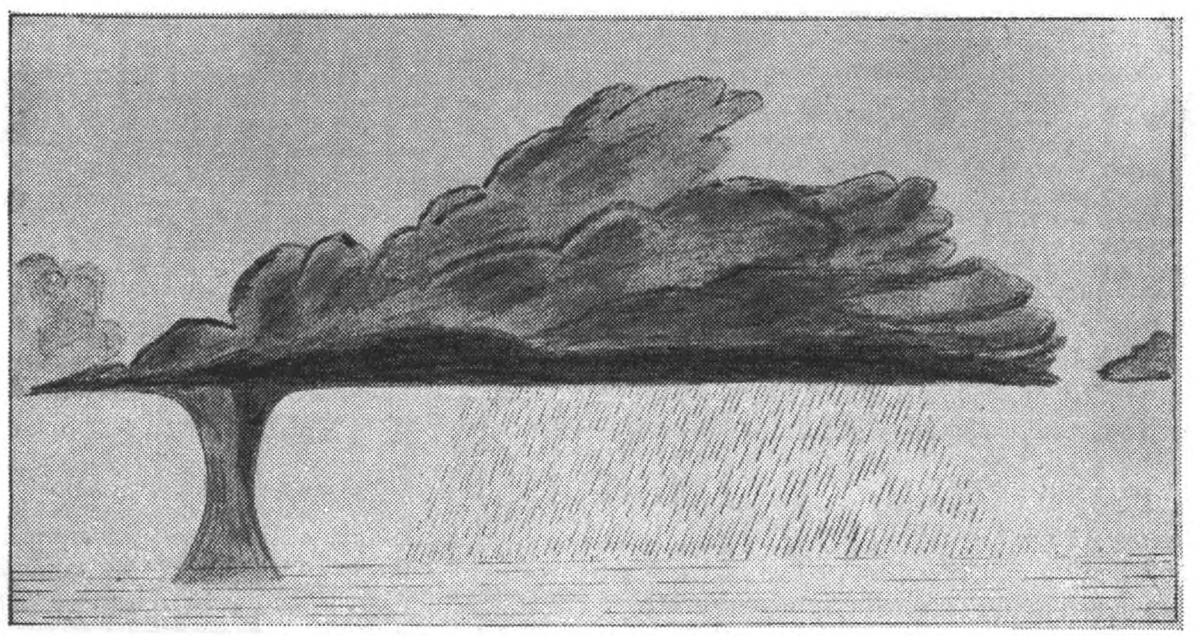
M.V. *San Velino.* Captain J. Thomson, O.B.E. Curaçao to Good Hope (La). Observer, Mr. A. Andrews, Chief Officer.

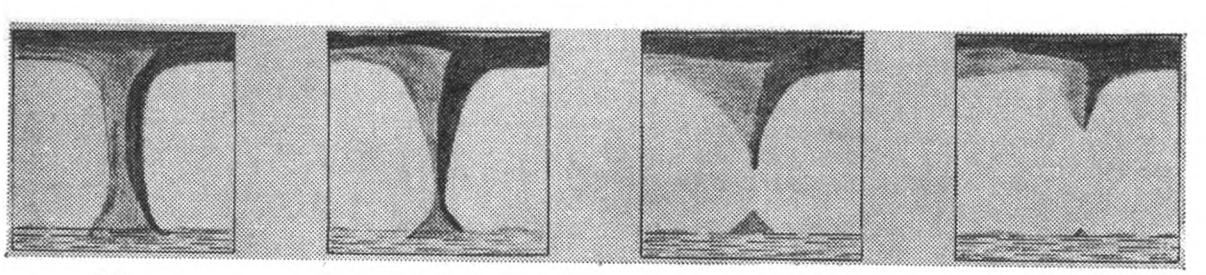
9th October, 1952, 2230 G.M.T. A waterspout was observed bearing N. The first intimation that it was forming was a cloud of spray rising above the water, from which the column formed to join a Cb cloud with base 200 ft. Rain was observed to be falling from cloud near by. After 6 min the spout became curved to give an approximate length of 500 ft, although the cloud base remained at 200 ft. It then disappeared at the centre and left a nearly horizontal column at a height of 200 ft, which gradually receded into the cloud. Wind N force 3. Air temp. 83°F, wet bulb 78°, sea temp. 83°. Cloud $\frac{3}{8}$ Cb, Cu and As.

Position of ship: 20° 30′N, 84° 00′W.

Bay of Bengal

S.S. *Maharaja*. Captain A. W. C. Jolly. Calcutta to Port Blair. Observer, Mr. D. G. Barton, 3rd Officer.





(1) (2) (3) (4)

3rd October, 1952, 0712 G.M.T. A well-developed waterspout from a large bank of Cu was observed to the SW at a distance of about 5 miles. There was an area of precipitation close by the spout. The phenomenon lasted 6 min. Air temp. 84°F, wet bulb 79°. Wind NE force 1.

Position of ship: 18½°N, 90°E.

Note. This observation was sent to us by the India Meteorological Department.

HAILSTORM

Red Sea

S.S. *Mahanada*. Captain H. C. Kinley. Suez to Aden. Observers, the Master and all officers.

1st to 2nd December, 1952. At 1730 G.M.T. on the 1st a severe electric storm commenced with lightning in all quarters, and wind SE'ly. At 2000 light rain showers began to fall. At 0200 on the 2nd there was continuous forked and sheet lightning with heavy thundery showers of rain, while at 0300 the wind backed to NE'E and a heavy hail shower occurred. The hailstones were irregular in shape and about ½ to ¾ in. across at the largest parts. A second heavy hailstorm fell at 0415, and at 0430 the wind veered to W and then backed to E again. About 0500 a moderate S'ly swell developed; the rain showers ceased about 0700 though lightning and thunder were still present.

At the beginning of the storm air temperature was 81°F with an unsteady barometer, but during the hailstorms air temperature fell to 76°. Clouds were chiefly Cb and the wind force 3 to 4.

The photograph opposite page 196, looking NE, was taken on the 1st at 2130 G.M.T. by Mr. A. W. M. Adlam, 3rd Officer, with a 30-sec exposure at f.9, in position 22° 22′N, 37° 25′E.

Position of ship at 1730 G.M.T. on the 1st: 23° 10′N, 36° 54′E; and at 0700 on the 2nd: 20° 20′N, 38° 39′E.

ST. ELMO'S FIRE

Off Florida

S.S. *San Velino.* Captain J. Thomson, O.B.E. Good Hope (La.) to Land's End. Observer, Mr. A. Andrews.

18th October, 1952, 0035 G.M.T. St. Elmo's fire was observed for about 10 min in the form of small white globes equally spaced 4 ft apart along the whole length of the aerial, 180 ft. Wind 030° force 3. Air temp. 81°F, wet bulb 77°, sea temp. 83°. Cloud 8/8 Fs and Ac.

Position of ship: 27° 32′N, 79° 38′W.

Note. In the log of *San Velino* lightning was recorded at the 0000 observation and thunder and lightning at 0600, as well as in the " past weather " column at that time. St. Elmo's fire is generally seen before, during or after a thunderstorm, but is said sometimes to occur at sea in storm weather without a thunderstorm. It takes a number of different forms on different occasions, and sometimes an object such as an aerial is seen enveloped in a general luminous glow without definite points or globes of light. It also varies in colour and degree of brightness. All forms of this phenomena are electrical discharges from the earth or objects on its surface into the air.

CLOUD PHOTOGRAPHS

Indian Ocean and Mediterranean Sea

S.S. *Clan Davidson.* Captain T. A. Watkinson. Colombo to Liverpool. Observer, Mr. P. C. W. Hoblyn, 2nd Officer, who sends a collection of six cloud photographs, reproduced facing page 197.

30th October, 1952, 0845 G.M.T. Photographs Nos. 1 and 2 were taken from the same position. No. 1 looks NW, Cu and Cb during a rain shower, radar distance 10½ miles. No. 2 looks SSW, fair weather Cu and some Ac. Wind 300° force 3, air temp. 82°F, wet bulb 74°. Position of ship: 09° 30′N, 64° 35′E.

14th November, 1952. Photograph No. 3 at 1110 G.M.T. was taken underneath a line of towering Cu, and No. 4 at 1115 G.M.T. of Ci and Cs. Wind calm, air temp. 71°, wet bulb 61°. Position of ship: 33° 46′N, 23° 14′E.

14th November, 1952. Photograph No. 5 at 1210 G.M.T. is of hooked Ci. Weather conditions same as Nos. 3 and 4. Position of ship: 33° 47′N, 23° 06′E.

15th November, 1952, 1210 G.M.T. Photograph No. 6 is of Ci and Cs. Wind s force 4, air temp. 69°, wet bulb 65°. Position of ship: 35° 35′N, 17° 00′E.

ABNORMAL REFRACTION

North Atlantic Ocean

M.V. *San Veronico.* Captain W. Wigham. United Kingdom to Venezuela. Observer, Mr. P. W. Hodges, 3rd Officer.

28th December, 1952, 0110 G.M.T. Venus was about to set. When at altitude 45′ the planet was bright, its colours alternating red and white; it appeared as a flare. At altitude 20′ Venus appeared to increase in size to about three or four times normal. At altitude 10′ an image appeared immediately above the planet then suddenly disappeared, and was replaced by an image below the planet. This

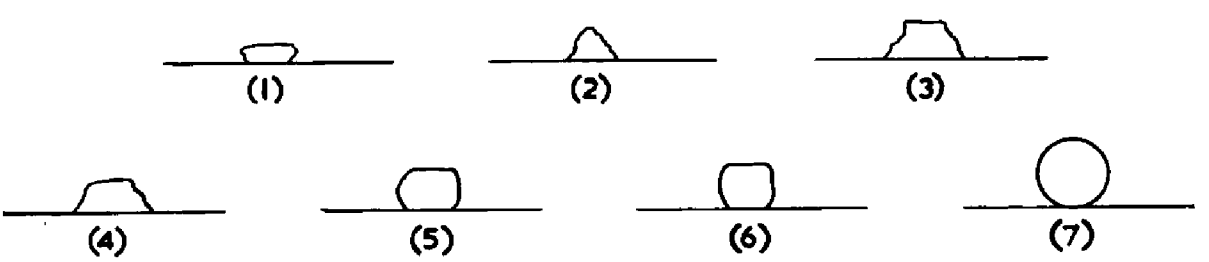
happened four times in quick succession. Before finally setting the planet appeared elongated to a vertical white streak which immediately turned a bright green. All these changes were visible to the unaided eye. Wind NE force 3. Cloud Sc $\frac{5}{8}$. Visibility upwards of 45 miles.

Position of ship: 16° 40′N, 62° 20′W.

Note. Observations of this character are not uncommon when either of the bright planets Venus or Jupiter is observed to set under conditions of abnormal refraction, particularly if binoculars are used. The above observation is of special interest on account of the variety of the changes observed, especially the alternate formation of images above and below the planet, which we do not remember to have seen recorded previously. A second point of interest is that all the changes were visible without optical aid. The final green colour is the phenomenon known as the green flash, of which many observations have been published in this journal, particularly in connection with the setting of the sun. It is evident that extreme conditions of abnormal refraction prevailed near the horizon on this evening and that they were subject to rapid changes.

Off Port Okha (West coast of India)

S.S. *Jalaprakash.* Captain J. Y. Kerr. Calcutta to Port Okha. Observers, the Captain and Mr. D. K. Bhattacharya, Chief Officer.



29th November, 1952, 0148 G.M.T. The shape of the sun was observed to be deformed on rising, as shown in the sketches. The sun's bearing was 113°(T) and was not rising over any land or reefs. The whole phenomenon lasted for about 2½ min. Air temp. 73·5°F, wet bulb 70°, sea temp. 75°. Wind N force 1–2. A thin layer of cirrus was observed about 3° above the horizon, just above the sun.

Position of ship: 22° 30·5′N, 69° 05′E.

Note. This observation was sent to us by the India Meteorological Department.

Tasmanian Sea

S.S. *Perim.* Captain R. J. F. Paige. Gladstone to Melbourne. Observer, Mr. G. Dobbin, 4th Officer.

20th October, 1952. At 0630 G.M.T. (1630 S.M.T.) distant mountain tops appeared to rise above the true horizon. The angle between the true horizon and the false was 15′, and that between the extreme ends 22°. One of the peaks was believed to be " Tom's Cap " (1,196 ft) in the Fatigue Range, bearing from ship 302°, distance 42 miles. Trees could be clearly seen on the mountains, and their tops were well-defined. Earlier in the day ships about 5 miles distant appeared to be raised slightly above the horizon. Air temp. 63°F, wet bulb 58°, sea temp. 57°. Cloudy with Cu, St and Ci. Wind 068° force 3.

Position of ship: 38° 42½′S, 147° 32½′E.

SCINTILLATION

Red Sea

S.S. *New Australia.* Captain K. D. G. Fisher. Suez to Aden. Observers, Mr. J. R. Richmond, 3rd Officer, and Mr. J. Marchmont, Cadet.

8th November, 1952, 2100 G.M.T. On rising, the star Canopus was observed to be changing colour from amber to deep bright red, then to a brilliant green. The bearing at time of observation was 150°. At the same time the moon was rising, bearing 072°. The altitude of Canopus was 5½° and the moon 9¾°. A close watch was kept on Canopus and it was observed that the colouring of the star ceased when its altitude became 16½° and bearing 166°(T). Visibility good, sky clear.

Position of ship: 19° 15′N, 39° 29′E.

AURORAE

North Atlantic Ocean

M.V. *San Vulfrano.* Captain L. Mays. Curaçao to Iceland. Observer, Mr. J. E. Back, 3rd Officer.

4th October, 1952, 0000 G.M.T. Aurora borealis was observed in the form of an arc from NNE through the zenith to NW, with intense green rays slowly moving along the arc and increasing in intensity from the northward. Shafts of flashing light in red spectrum colours also moved slowly along the arc, the shafts converging at the zenith. At 0015 G.M.T. the arc faded, and reformed from N to W at altitude 30°. At 0030 G.M.T. two arcs formed, one inside the other, from NW to SW at altitudes approximately 20° and 25°; shafts of light moved continuously around the two arcs. At 0040 G.M.T. the arcs faded and a new arc of elliptical shape formed from N to NW at altitude 10°. Green light moved around this arc, followed by shafts of light showing colours of the spectrum. At 0050 G.M.T. the light faded, and then one shaft resembling a searchlight beam was seen in NNW extending from the horizon to 60° altitude. At 0100 G.M.T. all lights faded and left a faint glow in NW until 0115 G.M.T. when the glow was no longer visible. During the whole observation stars were not at any time dimmed by the brightness of the light; there was a full moon in SW at approximate altitude 40°. Magnetic compasses were affected by 2° and 3°. At 0000 G.M.T. cloud ⅛ As, and at 0025 clouds began to dissolve. Barometer 1031·5 mb, air temp. 51°F.

Position of ship: 54° 28′N, 35° 30′W.

Further displays of aurora borealis were observed from this vessel during the nights 12th–13th October and 13th–14th October, 1952.

Gulf of St. Lawrence

S.S. *Asia.* Captain R. Conway, O.B.E., R.D., R.N.R. Montreal to Le Havre. Observer, Mr. D. H. Howells.

25th October, 1952, 2130 E.S.T. An auroral display lasting for approximately 2 hours, with a peak intensity for 20 min was observed. The phenomenon was mainly in band form from the horizon in the NE through an arc of about 140° to the SW. The lower border was sharply defined and shone brightly through patches of St. During the peak period of the display violet pulsating patches were visible around the main band. The ship's magnetic compasses were subject to abnormal W'ly deviation lasting for about 15 min, and intense interference resembling " earthing " of the apparatus was experienced with the W/T transmitter. Previous to the display abnormal refraction was observed in respect of shore lights.

Position of ship: 50° 00′N, 61° 00′W.

METEORS

North Atlantic Ocean

S.S. *Warkworth*. Captain N. Thompson, M.B.E. Churchill to Antwerp. Observer, Mr. A. P. Hurst, 2nd Officer.

5th October, 1952, 0336 G.M.T. A meteor of magnitude about −3 was observed just s of Aldebaran, altitude 47°, bearing 190°(T), moving ENE. It was of a blue-green colour and left a trail, about 4° in length, of equal brilliance and colour, throwing out many sparks. Before it disappeared below Pollux, at altitude 22°, bearing 090°(T), it flared up with a much greater brilliance for a fraction of a second and lit up the whole fore end of the vessel. The duration of flight was approximately 4 to 5 sec. There was some Ci at the time.

Position of ship: 58° 23′N, 19° 20′W.

S.S. *Manchester Pioneer*. Captain A. Starmer. Montreal to Manchester. Observer, Mr. J. M. Rushworth, 2nd Officer.

28th November, 1952, 0251 G.M.T. A brilliant meteor was observed, with a vivid emerald green head and trail of similar colour, 3° in length, in the SE quadrant between Regulus and Sirius. It appeared at an altitude of about 20°, and fell in a curving arc. Its brilliance far exceeded that of Sirius, and on disappearing behind a cloud bank, very low on the horizon, it apparently disintegrated, flaring up with a ruddy tinge, like a bomb explosion. The duration of the meteor was about 4 sec.

Position of ship: 50° 40′N, 22° 52′W.

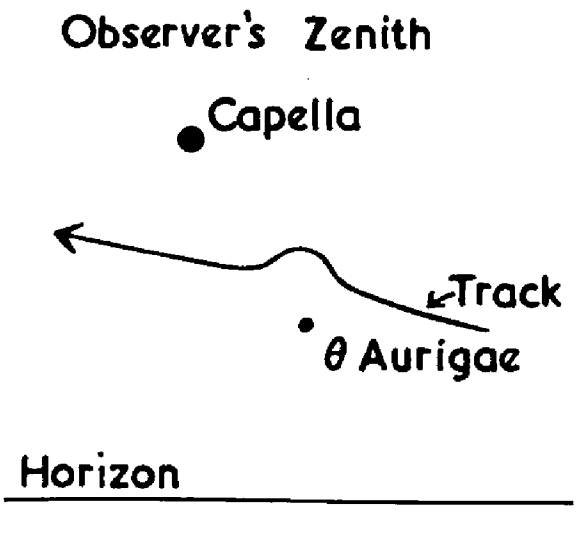
S.S. *Baron Murray*. Captain E. A. Brown. Quebec to London. Observer, Mr. C. W. Noakes, Chief Officer.

8th December, 1952, 0130 G.M.T. A brilliant meteor was observed which appeared near Orion and disappeared near to Sirius. It was observed for 1½ sec with magnitude equal to Sirius at first, but seemed to increase until the object disappeared with a flash of brilliancy that lit a track over the sea similar to that seen on a moonlit night. Noticeable colours were green and red; its trail disappeared rapidly.

Position of ship: 47° 48′N, 48° 40′W.

Bay of Biscay

M.V. *Glenorchy*. Captain P. Cross. Casablanca to London. Observer, Mr. P. Welch, 3rd Officer.



15th November, 1952, 0502 G.M.T. A meteor was sighted, bearing 090°(T), altitude 80°, heading in a WNW direction and appearing to pass between Capella and θ Aurigae. It appeared through a temporary break in low Cu. The bright flash and trail lit up the ship for about 40 sec, with a brilliance comparable to bright moonlight. The duration of flight was estimated at 3 to 4 sec, and its path passed through an arc of 5°. The track indicated that the meteor was deflected off its course, but recurved back on to its original course. The brilliance and whiteness indicated the passage of a very large meteor. Clouds obscured the initial and final trail.

Position of ship: 45° 27′N, 08° 22′W.

English Channel

S.S. *Kenuta.* Captain J. D. Richards. Cristobal to London. Observer, Mr. A. M. Jestico, 3rd Officer.

30th October, 0145 G.M.T. A brilliant green-coloured meteor (four to five times as bright as Sirius) was seen to explode after travelling about 10°. It disintegrated near the stars Castor and Pollux, and left behind a trail of green-coloured particles; these particles were visible for about 1½ min before they lost luminosity and slowly disappeared. The bearing of the particles was 092° and altitude 47½°.

Position of ship: 48° 35′N, 05° 38′W.

Caribbean Sea

S.S. *Rincon Hills.* Captain E. A. Mullock. Puerto La Cruz to Portland (Me). Observer, Mr. G. F. Burgess, Chief Officer.

28th October, 1952, 0015 G.M.T. A meteor of unusual intensity was observed originating very close to the star α Crucis, altitude 24°, bearing 178°, and travelling rather slowly in a direction 240° approx. Almost twice the size of Venus when setting, it was still visible when less than 5° above the horizon and had a very brilliant green trail. When passing behind heavy Ac clouds it gave the effect of lightning, leaving no doubt as to its brilliancy. Cloud 5/8 light Cs and 4/8 Ac extending from the horizon to an altitude of approx. 60°.

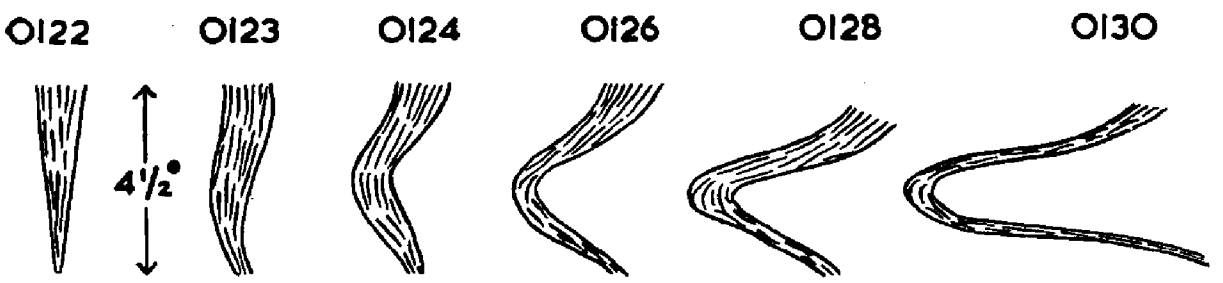
Position of ship: 13° 30′N, 64° 53′W.

Note. The above observation was sent to us by the Controller, Canadian Meteorological Division.

Mediterranean Sea

S.S. *Afghanistan.* Captain R. Connacher. Port Said to Antwerp. Observer, Mr. S. W. Jones, 2nd Officer.

15th November, 1952, 0122 G.M.T. A meteor of approximate magnitude −4 appeared to fall vertically midway through the constallation of Leo. The head was visible for 3 sec but its trail was observed for at least 2 min with the unaided eye



and for 6 min through binoculars. The accompanying sketches were made at the times indicated; the true bearing of the trail at its first appearance was 090°, and its length 4½° as measured by sextant.

Position of ship: 33° 30′N, 25° 08′E.

Indian Ocean

S.S. *Muncaster Castle.* Captain A. G. Gorham. Adelaide to Aden. Observer, Mr. C. H. Chandler, 3rd Officer.

8th December, 1952, 2120 G.M.T. A meteor was observed bearing 270°, altitude 20°, having a green spherical head and leaving a bright white trail of minor explosions in its wake. Three seconds later, when it bore 250°, altitude 10°, the green head exploded with a bright green flash, lighting the sky in the W. A few seconds later a bright white flash was observed bearing 280°, altitude 60°.

Position of ship: 09° 42′S, 69° 54′E.

Bay of Bengal

S.S. *Rajula*. Captain F. Mears. Penang to Nagapattinam. Observer, Mr. C. W. Jenkins.

4th December, 1952, 1245 G.M.T. A very bright meteor was observed travelling from NE to SW with initial and final altitudes of about 30°. When bearing SW it exploded into five fragments, which disappeared almost immediately. The meteor was a light greenish-blue colour and its time of flight was 3 to 4 sec.

Position of ship: 12° 18′N, 80° 06′E.

Note. This observation was sent to us by the India Meteorological Department.

FALSE IMAGES ON RADAR

Eastern U.S. coastal waters

S.S. *Rincon Hills*. Captain E. A. Mullock. Puerto La Cruz to Portland (Me). Observer, the Master.

1st November, 1952, 2345 G.M.T. When in position 41° 42′N, 69° 27′W, ships were observed at a distance of 50 miles (maximum radar range). Nantucket Island, Cape Cod and other land in the vicinity showed a clear outline having their correct bearing and distance from the vessel. This condition was observed for about 14 hours. Odd reflections appeared, having the character of normal vessels on the 15 mile range. About four or five images of vessels would appear at a distance of 8 to 10 miles in a straight line bearing NW, each image having smaller images on each side. These images would approach the PPI centre until they were lost in the sea return and then similar images would appear at a distance of 10 miles.

These ghost images continued for about 8 hours, a distance of 125 miles from Nantucket Shoals Buoy No. 10, on a course of 343° towards Portland. Radar interference was also present in the vicinity of these images, extending from the outer edge of the screen to the centre, having an arc of 10° to 15° width. The interference appeared as small white dots arranged in even rows all the same size.

Wind WSW force 2, shifting to NW force 2. Barometer 30·10 in, air temp. 53°F, sea 52°, wet bulb 51½°. Clear sky, low smoke haze with poor visibility. Moderate sea and swell.

The following day, 2nd November, when departing from Portland, similar images were observed, only this time they were bearing in a SW'ly direction.

Note. This observation was sent to us by the Controller, Canadian Meteorological Division.

Anti-Locust Campaign

Co-operation of ships needed

An extensive anti-locust campaign is being organised in the Middle East and Eastern Africa, the planning of the campaign being based on a wide network of reports on the movements of locust swarms. These reports are collected and analysed for the purpose of forecasting further developments in the locust situation.

The network over land areas is fairly close and comprehensive; many locust swarms, however, cross in their flight the Red Sea, Gulf of Aden, Persian Gulf and Arabian Sea.

Voluntary observers in the past have usually noted and recorded such swarms in their meteorological logbooks. This information is valuable for record purposes, but it is essential that swarm movements should immediately be known to anti-locust organisations which are concerned with forecasting the danger from swarms and in organising counter-measures.

The Meteorological Office has received a letter from the Director of the Anti-Locust Research Centre requesting ships' co-operation in the campaign. He asks ships to report locust swarms by radio to DESLOC NAIROBI as promptly as possible and through the most convenient coastal radio station. The cost of these messages will be borne by the Desert Locust Survey, P.O. Box 5152, Nairobi, Kenya.

When reporting locust swarms the following points should be included:

(i) Latitude and longitude, if possible to nearest minute.
(ii) Date, hour and zone time used.
(iii) Wind direction and speed.
(iv) Whether dense, thin or scattered swarm; individual fliers; or floating dead locusts, many or few.
(v) Colour of locusts (yellow, pink, grey).
(vi) Direction which locusts appear to be making good.
(vii) If locusts seen over wide area, time to pass, with course and speed of ship.

Typical messages would read as follows:

18° 05′N, 39° 33′E. 12th November, 1953. 1030 G.M.T.
Wind 220°, 12 knots. Dense swarm yellow locusts making good 060°, one hour to pass. Ship 195°, 10 knots.

20° 18′N, 38° 20′E. 30th April, 1954. 1520 G.M.T.
Wind 045°, 10 knots. Thin scattered swarm red locusts making good 225°. Ship 010°, 11 knots.

28° 47′N, 50° 31′E. 25th February, 1954. 0820 G.M.T.
Wind 010°, 15 knots. Many floating dead red locusts.

A note should be made in the remarks column of the logbook whenever such a radio message is sent.

The Port of Montreal

The following information was given in the issue of *Lloyd's List and Shipping Gazette* for 4th April, 1953. "The port of Montreal was opened on Thursday (2nd April, 1953), when the Canadian steamer *Seaboard Star* (7,190 tons gross) arrived from this country. This was the earliest opening on record. The previous record was in 1949, when the *Mont Alta* arrived on 7th April. Last year and in 1951 the first ship arrived on 13th April, in 1950 the date was 18th April and in 1948 19th April."

It is interesting to compare these dates with those given in the *St. Lawrence Pilot* (Tenth Edition, 1943), wherein it is stated that during the 58-year period 1874 to 1931 the earliest date on which the first vessel from sea arrived at Montreal was 11th April, the average date being 28th April, and the latest 11th May (in 1874). This year's record opening is therefore nine days in advance of the earliest date given in the *Pilot* and five days in advance of the previous record of 1949.

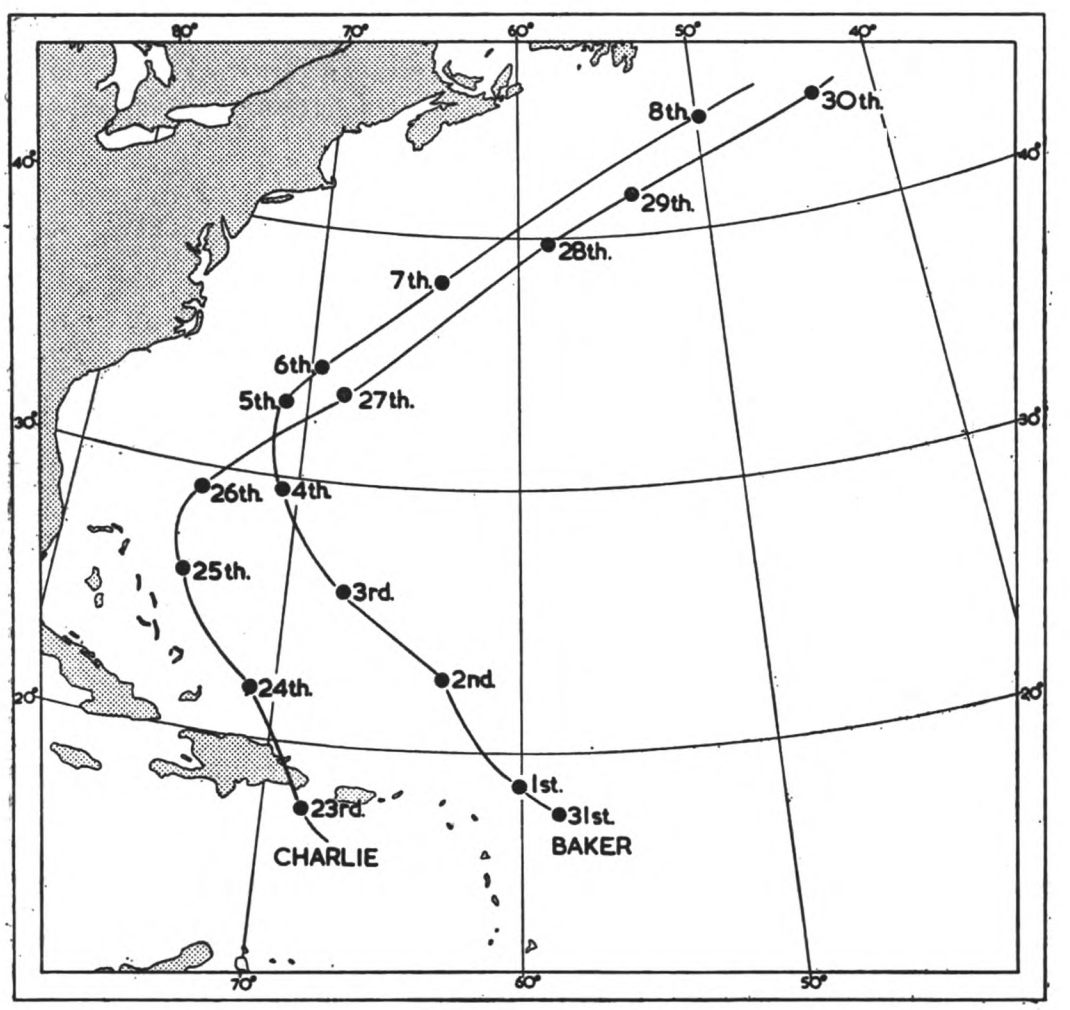
All the information given above refers to the date of entry into Montreal from the sea. The ship channel between Quebec and Montreal is often clear of ice somewhat earlier. For the same period, 1874 to 1931, the *Pilot* gives the date of opening of navigation in Montreal harbour as follows: earliest, 29th March; average, 18th April; latest, 6th May.

Notes on Hurricanes Baker and Charlie, Western North Atlantic Ocean, September, 1952

The track of hurricane BAKER from 1200 G.M.T. on 31st August, 1952, to 1200 on 8th September, 1952, is shown in Fig. 1. An observation of this hurricane has been received from M.V. *Australia Star*, Captain R. White, D.S.C., the extract from the meteorological log being as follows:

The *Australia Star* bound from Curaçao to London, passed Sombrero Light at 0254 G.M.T. on 1st September, 1952. During the preceding day the weather had been mainly fine and clear though highly developed Cb clouds formed in the late hours of the morning and numerous precipitations were seen to come from their bases; some heavy showers were experienced at the ship. The wind was SE'ly force 4 and the barometer, though unsteady, showed no great deviation from normal diurnal range. Through the day the wind backed slowly and was decreasing. Similar conditions prevailed throughout the night till the early hours of the morning of the 1st September, when at 0800 the wind was NNE force 3. At 1200 the wind had veered to E'ly and increased to force 4-5, barometer 1011·6 mb, temperature 76°F. The ship was now encountering a moderate E'ly swell and the sky had become overcast and threatened rain. Between 1200 and 1400 the wind, increasing slightly, varied between E and NE; the barometer was unsteady but still showed no great departure from normal diurnal range.

1400 G.M.T. The wind had increased suddenly to force 6 and the barometer began to fall sharply.



U.S. Weather Bureau

Fig. 1. Positions of hurricanes BAKER and CHARLIE, September, 1952. The positions shown are those at 1200 G.M.T. each day.

1600 G.M.T. Barometer reading 1005·1 mb. Barograph showing fall of 4·5 mb in two hours. The wind was now ENE force 6-7 and freshening. Temperature 80°, sea 81°. Waves ENE, 15-20 ft. The sky was completely overcast and heavy rain squalls were encountered.

1800 G.M.T. Approximate position 20° 45′N, 60° 16′W. The wind, veering steadily in the last two hours, had reached E'S force 10 from waves 20-25 ft. Barometer reading 1002·3 mb (this was the lowest pressure recorded). The barograph showed a fall of 9 mb in three hours. The sky had continued overcast with Ns cloud and there was continuous moderate heavy driving drizzle, the wind gusting at times to force 11.

1930 G.M.T. The wind had veered to S force 10, still gusting at times to 11. The height of the waves was now estimated at 30 ft with 120 ft between crests. The sky still overcast, with steady heavy rain. Barometer 1004·0 mb, was rising sharply.

2000 G.M.T. Wind S'ly force 9-10. Storm appeared to be abating with lengthening of swell. Sky still overcast with continual heavy rain. Barometer 1008·7 mb, rising sharply.

Thereafter the wind and sea decreased steadily and the barometer rose quickly, the sky remained overcast and the rain, though persistent, became lighter and finally ceased at 0100 on 2nd September. Barometer 1015·7 mb, rising less quickly. By 1200 the sky had cleared to 3/8 Cu, Ac and dense Ci cloud. Wind E'S force 3. Waves 180°, height approximately 10 ft.

No warning of the hurricane was heard prior to the passage of the hurricane across the vessel's track, though at 1600 on 1st September a U.S. Naval Station at Puerto Rico was heard asking for three-hourly weather reports from ships in an area to the south of the hurricane. From later reports it was estimated that at 1600 the ship in position was 60 miles N'W of the centre of the hurricane, which at that time was travelling WNW at 10-12 kt. The ship's course (056°) was taking her away from the centre out of the dangerous semicircle and thus it was not necessary to alter course.

The track of hurricane CHARLIE from 1200 on 23rd September to 1200 on 30th September is also shown in Fig. 1. An extract from the meteorological log of S.S. *Dorset*, Captain A. E. Williams, Curaçao to London, is given below.

Date (Time)	Hurricane CHARLIE	S.S. *Dorset*
26th September		
0900 G.M.T.	28·1°N, 75·2°W. Moving N, 10 kt. Winds at centre, 85 m.p.h.	In Chesapeake Bay. Bar. 1015·0 mb, starting to fall.
1300 G.M.T.	30·2°N, 74·0°W. Moving NNE, 12 kt. Winds at centre, 115 m.p.h.	Off Chesapeake Lightvessel. Course 075°(T), 16 kt. Wind NE, force 3.
2300 G.M.T.	31·4°N, 73°W. Moving NNE, 11 kt. Becoming more extensive in area.	37° 32′N, 72° 33′W. Course 076°, 16 kt. Wind NE, force 3. Vessel secured fore and aft for heavy weather.
27th September		
0900 G.M.T.	33·2°N, 69·4°W. Moving NE-ENE, 25 kt.	38° 05′N, 69° 45′W. Course 076°, 16 kt. Wind NE, force 3-4. Bar. 1010·0, still falling.
1500 G.M.T.	34°N, 67·3°W. Moving ENE, 20 kt. Winds at centre, 90 m.p.h.	38° 32′N, 67° 20′W. Course 075°, 15·5 kt. Wind NNE, force 4. Heavily overcast.
2200 G.M.T.	36°N, 63·5°W. Moving ENE, 35 kt. Becoming extensive in area. Gales out 400 miles from centre.	39° 15′N, 65° 25′W. Course 075°, 15 kt. Wind NNE, force 6-7. Overcast sky which turned bright orange at sunset for period of half an hour. Rough sea, confused swell. Reduced speed. Bar. 1005·0.
28th September		
0800 G.M.T.	39°N, 57°W. Moving ENE, 30 kt. Gales extending 400 miles.	39° 35′N, 62° 32′W. Course 075°, 10 kt. Wind N'W, force 8. Very rough sea. Heavy confused swell.
1400 G.M.T.	40·5°N, 56·5°W. Moving ENE, 30 kt.	39° 40′N, 62° 20′W. Course 075°, 10 kt. Wind NW'N, force 9. Very rough seas, heavy confused swell. Bar. 1008·0, rising.

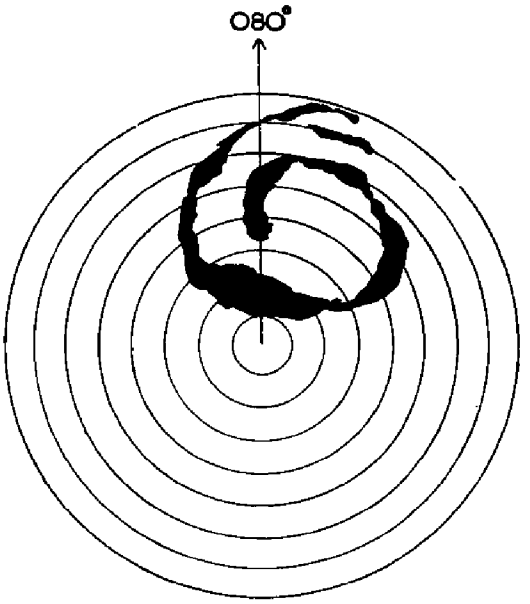


Fig. 2. 5.40 p.m. Bar. 1010 mb, falling rapidly. Wind NE, force 8. Sea rough. Aircraft reports give position of centre 50 miles to SW of ship.

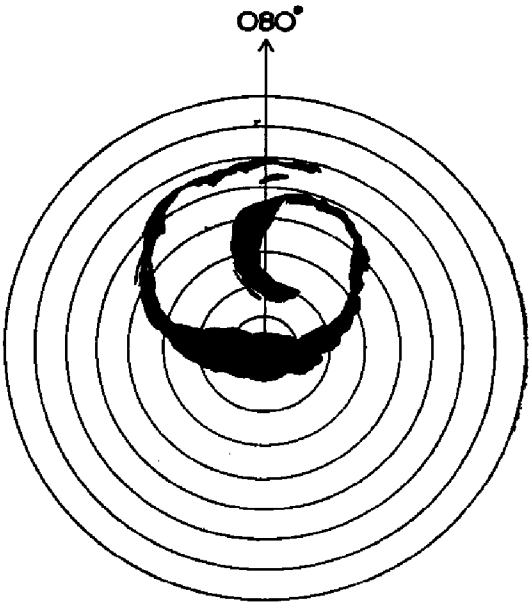


Fig. 3. 6.00 p.m. Bar. 1001·0 mb. Wind NE'E, force 8-9. Overcast, heavy rain. Sent CQ weather reports to all ships and Washington.

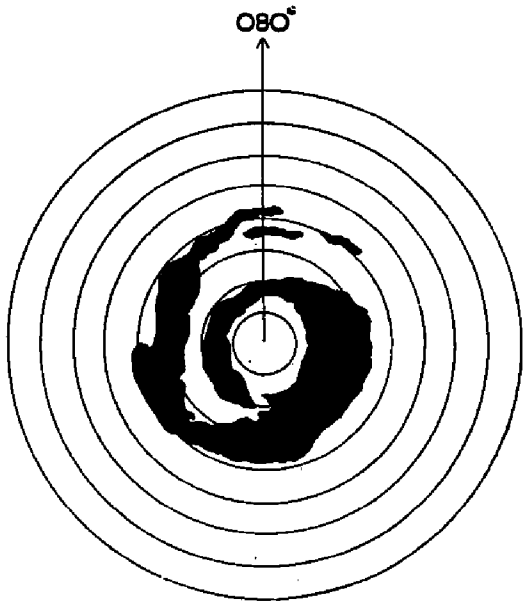


Fig. 4. 7.00 p.m. Ship at centre of hurricane. Bar. 990·5 mb, steady. Wind variable, light to moderate. Sea rough, confused. Extent of centre 5-8 miles.

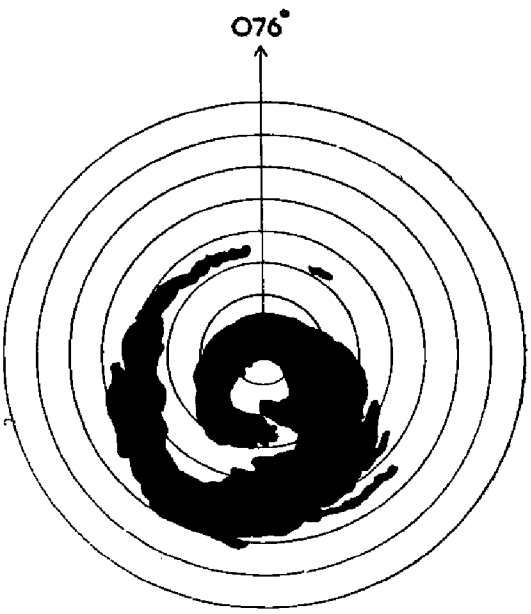


Fig. 5. 7.45 p.m. Bar. 995·3 mb. Shift of wind to SSW, force 9. Altered course to 176°(T). Sea rough, high. Overcast, heavy rain. Sent CQ weather reports to all ships and Washington.

Figs. 2-5 are sketches of the radar screen of M.V. *Samanco* when encountering hurricane CHARLIE near Abacos Islands on 25th September, 1952. The radar range was 40 miles. Sketches made by P. D. O'Driscoll, Chief Officer.

29th September		
0600 G.M.T.	41°N, 54°W. Moving ENE, 15 kt. Gales extending 400 miles.	40° 10′N, 59° 50′W. Course 075°, 8 kt. Wind NW, force 9. High seas 40-50 ft, confused very heavy swell. Bar. 1008·5, steady.
30th September		
0000 G.M.T.	40·6°N, 52°W. Moving ENE, 8-10 kt. Winds at centre, 80 m.p.h. Gales extending 400 miles.	40° 48′N, 55° 50′W. Course 075°, 10 kt. Wind NNW, force 6-7. moderating seas, heavy N'ly swell.
0800 G.M.T.	41°N, 50°W. Moving E, 10 kt. Developing into storm.	41° 00′N, 54° 15′W. Course 075°, 10 kt. Wind NNW, force 5-6. Seas and swell moderating.

The positions of hurricane CHARLIE were plotted according to American weather reports with corrections applied from our own position. Throughout the whole period heavy Cu and Cb covered sky, breaking slightly on 30th September.

Some very interesting sketches of this hurricane, as seen on the radar screen of M.V. *Samanco* on 25th September, in position 26° 12′N, 74° 54′W, have been received from Captain J. Williams and are reproduced in Figs. 2–5. The ship was on passage from Bermuda to Nassau. Captain Williams wrote as follows:

> The sketches are produced by the aid of Marconi type Radar Mark IV.
>
> No previous indications by sea, swell or sky appearance were in evidence of a tropical storm being in the vicinity, except a sharp fall in the barometer and barograph reading at short notice, followed by reconnaissance air reports, and it is concluded this position to be the formation point of the hurricane.
>
> An interesting point noted at the time was the large number of birds of various types apparently drawn into the centre of the storm and flying around the masthead light, most of them being in an exhausted condition.
>
> I trust this information will be of value in the future developments of radar performance, in connection with research work now being carried out.

There is only one entry relating to the hurricane in *Samanco*'s meteorological log, the observation made at 0000 on 25th September, which is given in full:

> Position 26° 56′N, 74° 50′W. Course 070°, 11 kt. Wind 040°, Beaufort force 8. Barometer corrected 995·0 mb, falling, then falling more quickly, change in previous three hours 10·2 mb. Air 78°, wet bulb 76°, dew point 75°. Present weather *oq*, past weather *oq*. Visibility by scale 96, sky 8/8 clouded (types not specified). Waves from 045°, period 7 seconds, height 35 ft.

The radar sketches and information sent by M.V. *Samanco* were forwarded to the Director, Naval Weather Service, who in reply said that they had been studied with great interest. His comments were as follows:

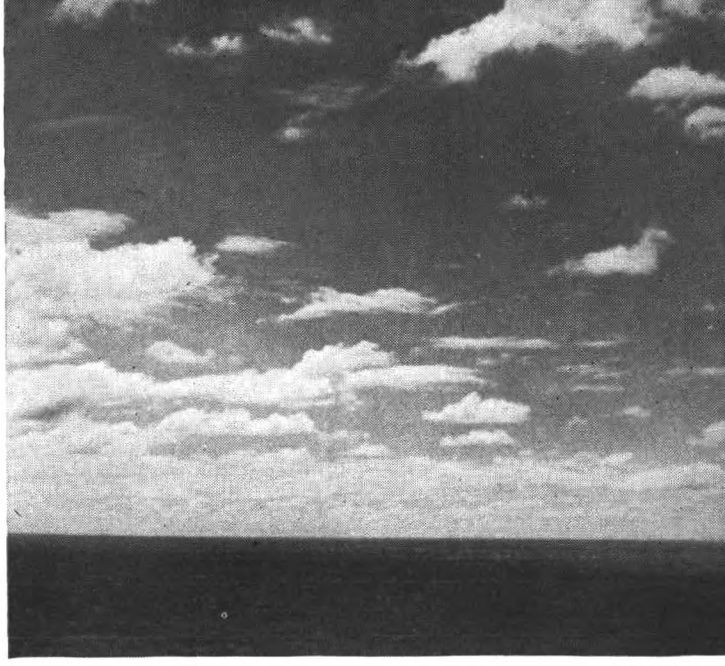
> These careful and detailed radar observations of the structure of the storm are of considerable value, especially as the eye of the storm passed over the ship, and reports of this nature from the centre of a hurricane are most uncommon. The series from the *Samanco* shows very clearly the inward spiralling of the airflow about the centre, and the rapid development of the precipitation area within the short period of two hours.
>
> The Daily Weather Reports for this period indicate that the hurricane formed near the reported position and this agrees with the master's conclusion. The storm moved NE'wards without deepening markedly and was absorbed by an extra-tropical system.
>
> It is interesting to note that the reported wave height and period correspond to the maximum theoretical permissible steepness of waves, an unusual observation. According to present-day methods of estimating wave height, the observed winds of force 8-9 would not be strong enough to raise waves of height 35 ft. It would appear, therefore, that the height may have been overestimated.

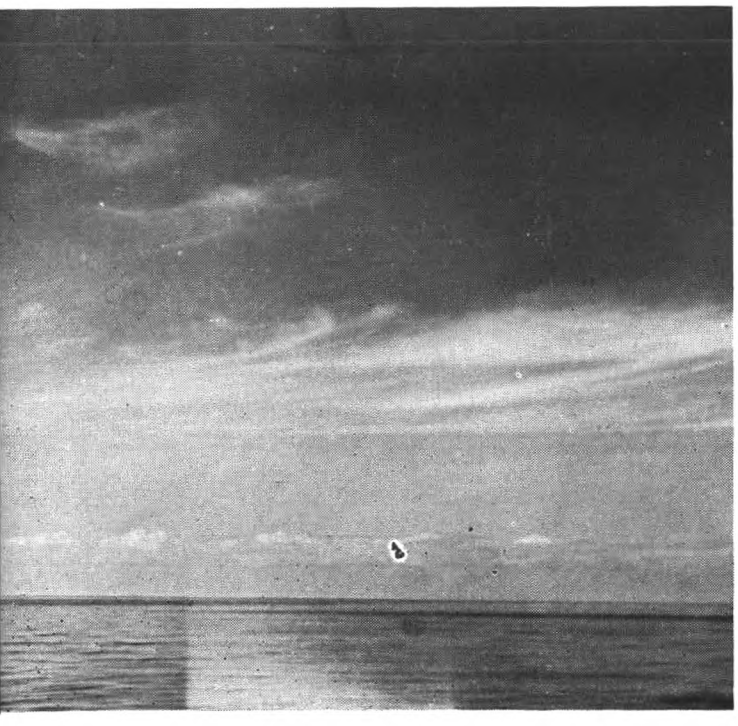
One of the authors of the recently published book *The Use of Radar at Sea*, has stated that he would have liked to have included these radar sketches in the book if they had been available at the time.

The observations of the three ships referred to above, including the radar sketches, were forwarded to Dr. Reichelderfer, the Chief of the U.S. Weather Bureau, who expressed his appreciation. He sent us in return the track chart, reproduced as

Crepuscular rays observed from O.W.S. *Weather Recorder* on 29th December, 1952, 1630 G.M.T., at station JULIETT (52° 30′N, 20° 00′W).

Lightning observed from S.S. *Mahanada* during the hailstorm reported on page 201.





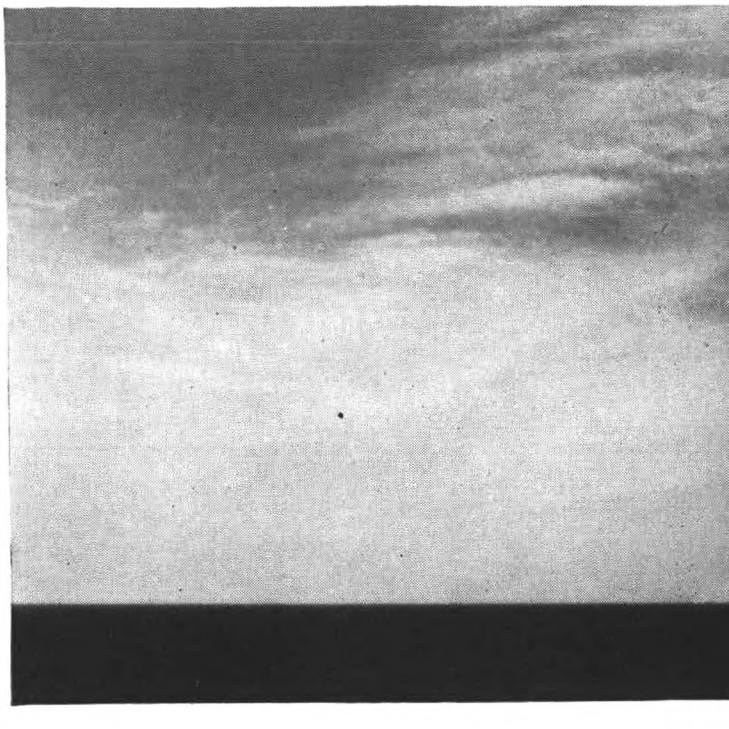


Fig. 1, and copies of official Weather Bureau advisories relating to both hurricanes. In addition he enclosed a list of British ships in the vicinity of hurricane CHARLIE that sent regular and/or special radio weather messages to Washington during the period 25th to 30th September, 1952.

These ships are as follows: *Amakura*,* *Atheltemplar*, *Dorset*,* *Esso Plymouth*,* *Forth Bank*,† *Lakonia*, *Loch Garth*,* *Monarch*,* *Oswestry Grange*, *Polamhall*, *Samanco*,* *San Velino*,* *San Vulfrano*,* *Surf Pioneer*, *Tribulus*,* *Trocas*. (*British selected ships; †Supplementary ship.)

With the exception of S.S. *Dorset* and M.V. *Samanco* the logbooks of the selected ships show that they were all too far away to be affected by the hurricane.

E. W. B.

The Loss of H.M.S. *Conway*

14th April, 1953

By GEOFFREY DRAKE
(Chief Officer of the *Conway*)

The recent loss of H.M.S. *Conway* in the Menai Strait is much more than just another ship aground and declared a total loss: it is a national tragedy. She was the last complete wooden ship of the line afloat; a supreme example of the shipwright's art, and as such a national monument.

She was laid down in Devonport in 1827 as H.M.S. *Nile* and at her launching in 1839 a great crowd assembled to watch her take the sea. She was named by Miss Warren, the daughter of the Admiral Superintendent of Devonport on 29th June, 1839, and the local newspaper estimated the crowd at over 50,000, a number which may in part have been due to the fact that the day was the anniversary of Queen Victoria's Coronation.

She was not commissioned until 1852, after being fitted with an engine (of 500 N.H.P.) and screw propeller, by whose aid she achieved a speed on trials of 6·85 knots, about the same as she was capable of under sail when clean full. She was ship-rigged according to the practice of her time, with royal yards on all three masts, studding sails on the fore and main yards, a main trysail setting to a gaff abaft the mainmast and an immense spanker setting to a highly steeved gaff and a boom projecting many feet abaft her taffrail.

In 1854 she was one of a fleet engaged in the Baltic against the Russians, and in the spring of the following year she went again to that sphere, where she was in action in several minor engagements. After the peace with Russia, in 1856 she went to North America and the West Indies; in 1858 she was flagship at Queenstown, and at about this time she was fitted with new boilers, and had her main armament reduced from 92 to 78 guns, of which those on her forecastle and poop were rifled for firing shells. At the beginning of the hurricane season in the Atlantic in 1859 she weathered a tropical revolving storm whilst on her way to take up duties as flagship on the North America and West Indies station.

On her return home in 1864 she paid off at Devonport and remained there in what was called Fourth Division Reserve until 1875, when her engines were removed before she was towed to the Mersey to become the third *Conway* in June, 1876.

The history of her 77 years as a cadet training ship, during which she has mothered and trained over 10,000 men, is told by Dr. John Masefield in his book *The Conway*. In the main, it has been a history of quiet and uneventful progress; of training that has had its ups and downs as is shown in that book, for in the early 1900s a *Conway* boy says: " Some things were well taught, notably meteorology, navigation, the use of ships' instruments and, of course, all boat work ".

It was in about 1880 that the cadets began to keep a meteorological log, and that the instruction in this subject was adequate, the long list of " Excellent " awards for the logs submitted would appear to be sufficient evidence. In 1920 the Marine Superintendent of the Meteorological Office, Captain L. A. Brooke Smith, R.D.,

R.N.R., himself an old *Conway* boy, conferred with Captain Broadbent and they designed a Cadets' Meteorological Log for the specific use of training establishments, aimed at the development of cadets' powers of observation. This was kept by the senior cadets in rotation, assisted by a junior, until some time during the late war, when it was replaced by the meteorological log as kept by the voluntary observing fleet, and later by the synoptic weather report form. For many years Mr. C. E. Lee was in charge of the instruction of cadets in meteorology, until he retired in 1945.

When, in 1941, the old ship was shifted from the Mersey to Bangor Pool in the Menai Strait, a chapter in history came to an end. Somewhere in his book John Masefield says, concerning the River Mersey: " For beauty, interest and variety, no scene on earth could compare with the river in which we lived. We were in the sea world and of it, initiated into the mystery and free of the guild, and there at its busiest heart." It may seem perhaps ironic that she should have been shifted here to Bangor for the sake of safety, and that here she should meet her tragic end.

When it was decided to take the ship to the Mersey for an extensive refit this summer recess, very careful consideration had to be given to the passage of the the Swellies, the reef-strewn couple of miles between the tubular and suspension bridges over the Straits. It was decided that she should make that passage at the equinoctial springs, spending the summer term in Bangor Pool and in the summer holidays going to the Mersey, so as to return to Plas Newydd at the autumnal equinox. On the night before the shift, the wind in Liverpool Bay was fresh from the NW, though at Plas Newydd only light. Normally there is a stand of the stream in the Swellies of about 13 minutes at the change of direction—which occurs about an hour and a half before high water—but on the morning of 14th April the wind had cut this stand to only a minute or so, and though she was almost exactly on the prearranged schedule, the south-going stream made so quickly and so violently that the tugs were unable to keep her moving ahead, and when she took a sheer and the tide and wind caught her broad on the port bow there was nothing which could save her.

In the *Manchester Guardian* on the day after she was declared a total loss there appeared these lines:

Oak is the flesh that crumbles and corrupts,
  And rust shall eat the nails.
Time shall consume her body on the rocks
  As moths consumed her sails.

The wind that drove her on the Baltic Sea
  Drives ships no more:
The tide has tossed an era, heedlessly,
  On Menai shore.

The hulk that you can see from Telford's bridge
  Slowly disintegrates;
While coal and oil drive ships through trough and ridge,
  Her sons captains and mates.

Were then her timbers' strength, her masts and spars
  Time's sickly dross ?
Write off the universe of suns and stars
  A total loss!

Write off the wreck, the metal and the wood,
  The hardship and the pain;
But no marine accountant can compute
  The total gain!

This poem is by Mr. Francis Drake, brother of Mr. Geoffrey Drake.

National Institute of Oceanography

The annual report for 1951–52 of the National Institute of Oceanography just published (Cambridge University Press, price 5s.) gives a full account of the organisation, work and future programme of the Institute.

The report on the progress in marine physics includes the following.

Waves and swell

The spectral distribution of wave energy in a storm area has been considered, and the relative amplitudes of the component wave trains which make the wave pattern have been deduced empirically over a wide range of wind conditions. The results suggest that waves reach an approximate equilibrium with the wind after the wind has acted on the water for 200 to 300 miles. Further action of the wind seems to cause little or no increase in the waves. In the equilibrium condition the steepness of the highest waves appears to depend on the inverse square root of the wind velocity as well as on the ratio of wave velocity to wind velocity; although the waves produced by a strong wind blowing for a long time are higher than those produced by a lesser wind, they tend to be longer and less steep.

Some theoretical foundation has been found for the empirical relationships. It involves the assumption that the wind acts on each component wave train independently and that the pressure of the wind on the windward side of the wave depends on the wave steepness. The results provide a useful basis for the prediction of waves and swell in deep water, or in the approaches to a coast, from meteorological charts and forecasts. For more sheltered places the results have to be modified by what is known of the effects of the topography of the land and sea bottom and the tides.

Routine wave-recording has been continued at Perranporth, and wave-recording and analysing equipment has been installed at Casablanca for the Service de Physique du Globe et de Meteorologie. It is expected that examination of the swell arriving at both stations from the same storms will add considerably to our knowledge of the decrease in height and other possible changes as swell travels away from a storm area.

Sea waves and microseisms

Further evidence has been accumulated to show that analyses of the seismograph records made by the Meteorological Office at Kew Observatory can be used to obtain information about wave activity west of the British Isles. Attempts to find the direction of a storm by comparing the phases and amplitudes of the E–W and N–S components of ground movement have not been successful. The evidence gives some indication that the ground movements at the recording station are so complicated, presumably by the interference of microseismic waves which have undergone multiple refractions and reflections, that the momentary or average relationships between the phases and amplitudes of the two horizontal components give no indication of the bearing of the source of the waves. The advantages which might be gained by using the method at outlying stations to obtain warning of the approach of heavy swell and storm waves justify further investigation and we have now some reason to believe that most information will be gained by comparing simultaneous wave and microseism recordings at stations 1,000 miles or more apart. With the help of the Director of the Meteorological Office, it may be possible to arrange the necessary collaboration with the Service de Physique du Globe to compare records made at Perranporth and Kew with corresponding recordings at Casablanca.

Exchange of energy between sea and atmosphere

Theoretical and experimental work in the United States of America and this country continues to emphasise the need for more detailed understanding of the

relative importance of the effect of winds and of density differences between one part of the ocean and another on the ocean currents and the slower deep-water circulation. The immediate requirement is for more information about the frictional forces in the oceans, and at the boundaries between the water, air and earth.

To make a start on these problems, measurements have been made at the King George VI reservoir at Staines of the changes of wind speed with height in the first 30 ft above the water surface; and the programme is being continued till representative observations have been made throughout a wide range of conditions of air stability. The apparatus is being extended to allow simultaneous measurements of the temperature and humidity profiles, radiation and of the temperature profiles and water movements in the reservoir. The wind measurements are being correlated with records of waves and ripples on the water and with the tilt of the water surface.

To study the large-scale exchange of heat energy between the oceans and atmosphere, and particular features of the water circulation, data compiled by the Marine Branch of the Meteorological Office from observations made by ships during the past 100 years have been used to calculate the heat exchanges due to radiation, conduction and evaporation over the South Atlantic Ocean. Charts have been prepared for the winter and summer seasons showing which areas, on the average, are being heated and which cooled. From the figures it should be possible to make some estimate of the transport of water from one latitude to another and in one or two places of the upwelling of water from deeper, colder layers. The work is being extended to cover the Indian and Southern Oceans. With the help of the Director of the Meteorological Office the basic monthly mean values of temperature humidity, wind, etc., are being punched on Hollerith cards so that recalculations can easily be made as our knowledge of the basic processes improves.

The work of the Institute included development of the following instruments:

(*a*) Shipborne wave recorder, which is contained completely within the hull of a ship. In principle it measures the heights of the waves above a point on the ship's hull, and the height of this point above an imaginary, stationary reference plane. The sum of the two measurements gives the wave profile above the reference plane and is independent of the movement of the ship. The height of a wave above the point on the hull is measured by the pressure transmitted through a small hole in the ship's side, and the up-and-down movements of the ship's side are recorded with the help of a vertical accelerometer, the output of which is integrated twice, electronically. This recorder has been fitted to the R.R.S. *Discovery II* and appears suitable for routine recording.* With a ship steaming very slowly or stopped, the wave measurements have an overall accuracy of ± 10 per cent.

(*b*) Wave analyser.

(*c*) Ripple and model-wave recorder, which is intended to measure as much detail of waves as possible.

(*d*) Bathythermograph calibrator.

(*e*) Apparatus for salinity determination.

(*f*) Sensitive resistance thermometers.

(*g*) Beach gradient and profile recorders.

Continued support has been given to the programme of measurement of water movements in the English Channel and North Sea organised by the Oceanographical Branch of the Admiralty Hydrographic Department. Also two of the Institute's staff have been studying and developing bottom sampling techniques and examining cores and samples of the sea bottom in this Oceanographical Branch under the guidance of Dr. J. N. Carruthers.

*The shipborne wave recorder has now been fitted for trial purposes to one of the British ocean weather ships.

The scientific work of the R.R.S. *Discovery II* is also described. The voyages of this ship included the second winter circumnavigation of the Antarctic regions and contact was made several times with the edge of the pack-ice. Assistance was also given to the Australian National Research Expedition established at Heard Island.

Research on whales

Owing to financial considerations the National Institute of Oceanography is not able to put in hand a programme of whale-marking on the scale which is needed, though the possibility of overcoming the financial difficulty is being examined. In the meantime it may be possible to arrange some marking on a small scale by co-operation with other bodies. Seven of the marks fired before the war were recovered in the Antarctic whaling season of 1951–52. As regards the distribution of whales, new plans have also been made for observations from ships and from the air. The Meteorological Office has kindly assisted in the dissemination, through Port Meteorological Officers, of instructions on recording and reporting all Cetacea observed from merchant and other ships. It is hoped that voluntary observers in a large number of ships will take part in the scheme and that, as the data accumulates, new knowledge will be obtained on the relative density of the populations of whales and other Cetacea in different parts of the world. Some of the first reports have already been received. The Royal Air Force (Coastal Command) and Royal Australian Air Force have kindly undertaken to inform the National Institute of Oceanography of whales observed during training flights in British and Australian waters.

P. R. B.

The *Challenger* Society

The *Challenger* Society, the function of which is to foster the science of oceanography in all its branches, was founded in 1903 and the first scientific meeting was held on 29th April of that year. The Society was named after the old H.M.S. *Challenger* which carried out the famous expedition of 1872–76, the object of which was to study oceanography and the meteorology of the oceans, all round the world. This expedition is generally held to be the starting point of the modern science of oceanography. The *Challenger* Society held its 50th Anniversary Meeting on 29th April, 1953, and to mark the occasion a collection of exhibits from the old *Challenger* was shown. This included the sailing instructions, charts of the course of the ship, surveying drawings, logbooks and personal diaries, an album of photographs taken on the voyage and other exhibits, among which was one of the sea thermometers actually used.

An unofficial film was also shown, part of which was in colour, of episodes of the voyage round the world of the present-day H.M.S. *Challenger* in 1950–52. It may be recollected that on this voyage the greatest ocean depth so far recorded was found. This was 5,940 fathoms in the Marianas Trench. Parts of the film showed various aspects of oceanographical work in progress. One meteorological factor which the film emphasised was that the Pacific Ocean is perhaps misnamed, judging by the amount of very rough weather which the ship had during much of the time she was in that ocean.

The chair was taken by Colonel R. B. Seymour Sewell, C.I.E., F.R.S., who led the John Murray Expedition to the Indian Ocean in 1933–34. After the meeting 43 members and guests of the Society dined at the Café Royal, at which function Colonel Seymour Sewell was the guest of honour.

E. W. B.

Frost smoke and unusually low air temperature at Ocean Weather Station India

By R. F. M. Hay, M.A.
(Marine Branch, Meteorological Office)

On 14th December, 1952, at 0400 G.M.T., an occurrence of "Arctic frost smoke" was noted by O.W.S. *Weather Explorer* at 60° 37'N, 14° 00'W. As this is the first occasion on which this phenomenon has been observed by a British ocean weather ship, and as it is not very widely observed outside the polar regions, the circumstances in which it occurred have been examined as closely as possible.

At the time when frost smoke was observed, air temperature at *Weather Explorer* was 27°F and sea temperature 48°F. The Daily Weather Report for the period showed that this resulted from an outbreak of unusually cold air, and that air directly above the surface friction layer which reached *Weather Explorer* at 0600 G.M.T. on the 14th, had followed a nearly direct trajectory from Spitzbergen in the previous 36 hours. Air at 700 mb (about 10,000 ft) which reached the ship at 0300 on the 14th was found to have moved from a position just to E of Scoresby Sound in the previous 24 hours. Since ascents at Keflavik and Cape Tobin showed the N'ly airstream was almost "solid" in the lowest 10,000 ft, it is fairly certain that all the cold air in this layer which arrived over *Weather Explorer* early on the 14th had originated over the ice-covered ocean off eastern Greenland. The Upper Air Section of the D.W.R. also includes a statement that the temperature sounding for Jan Mayen for 1400 on the 13th gave a value of 16,000 ft for the 1,000–500 mb thickness which was the lowest value for December during the previous six years.

The ship's thermogram shows that air temperature was falling through the previous 36 hours with frequent fluctuations, in at least two cases it fell 4°F or more within 5 to 10 min. Earlier on the 13th temperature fluctuations resembled the usual "embroidery" of the thermogram, but as the colder air arrived the magnitude of the fluctuations increased together with the interval between them. The cold air behaved as though minor cold fronts were passing the ship, or as though a superadiabatic lapse rate was being established which broke down at intervals of half an hour or more with the result that "bubbles" of heated air rapidly left the surface and were replaced by fresh cold air. The cold air did not reach station "J" (52° 30'N, 20° 00'W), where the lowest temperature on the 14th was 39·0°F at 1000 G.M.T.

In his log the observer states: "Fog was observed for a short period at 0400 G.M.T., 14th December. Owing to darkness it was not possible to estimate the visibility accurately, but it was thought to be about ¼ mile. The dry bulb was reading 27°F, dew point 21°, and the sea temperature was 48°. It was presumed that the poor visibility was caused by Arctic smoke." The observer does not quote a wind speed for 0400, but at 0300 the wind was logged as 360° force 7, and at 0600 as 360°, force 8.

The table below gives the portions of the log of interest around this time.

Date	Time	Ship's position Lat.	Long.	Wind Dir. (T)	Force	Temp. (°F) Air	Dew Point	Sea	Weather	Vis.	Low Cloud Type	Amount	Total Cloud Amount
1952	00	60° 45′	14° 02′	023°	7	29·2	28·6	48·5	cps	94	Cb	7+	7+
Dec.	03	60° 41′	14° 02′	360°	7	29·8	20·5	48·1	bc/ps	96	Cb	4	4
14th	06	60° 37′	14° 00′	360°	8	26·2	23·7	47·9	cps	94	Cb	7+	7+
	09	60° 45′	14° 00′	350°	8	29·0	26·7	48·6	cq/phs	96	Cb	7+	7+
	12	60° 51′	14° 01′	360°	6	28·8	17·5	48·8	cps	98	Cb	6	7

In his meteorological report on the British Antarctic Expedition 1910–13, Simpson*[1] makes the following comments on fog observed at Cape Evans. "When the temperature was low and the wind high, a peculiar kind of surface mist or fog was seen over the water; this generally went by the name of frost smoke. Once or twice this was blown over the station, when it was seen to be composed of minute ice crystals which gave rise to the usual system of rings and mock suns around the sun."

Wright and Priestley[2] on the same expedition also comment: "Numerous records of the temperature at which frost smoke was observed to form over the open sea suggest that this phenomenon requires that the air temperature should not be above about 0°F. Another point that seems to be well established is that wind plays a very significant part in its formation, as it was noted that, at low temperatures,† frost smoke formed even in very light winds, while at temperatures of 0°F or a little below, a wind velocity of over 20 m.p.h. (17 kt) was necessary for the formation of the smoke." Most observers confirm that the frost smoke occurs in a layer only a few feet thick.

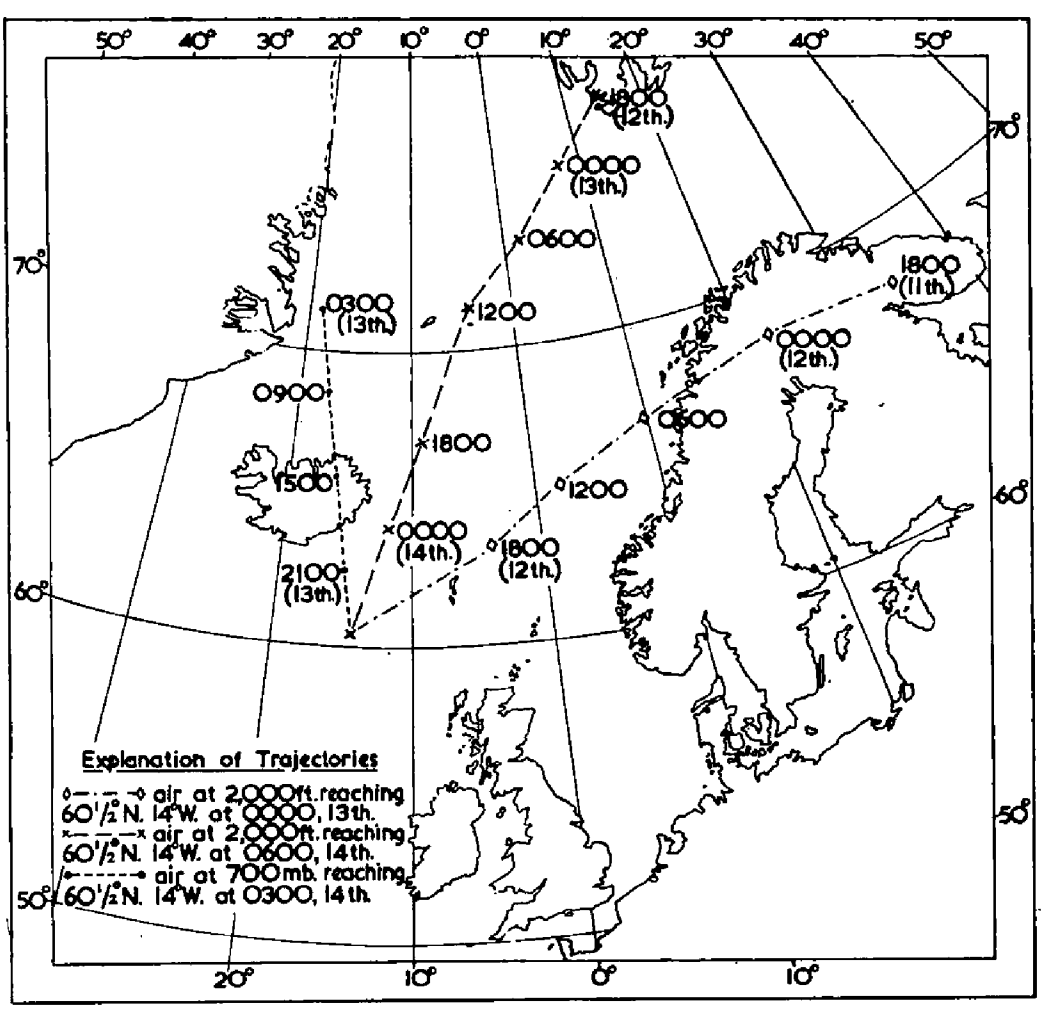


Fig. 1. Trajectories of air reaching station INDIA on 13th-14th December, 1952.

The observation made by *Weather Explorer*, together with the recent observations by Starbuck[3], make it evident that the phenomenon can occur at much higher temperatures. This is not unreasonable since the decisive factor in the formation of frost smoke is evidently the rapid saturation of air in the layer next to the sea surface, which needs the production and maintenance of a steep gradient of

* The numbers refer to the list of references on page 225.

† *i.e.* low temperatures for the Antarctic, well below 0°F.

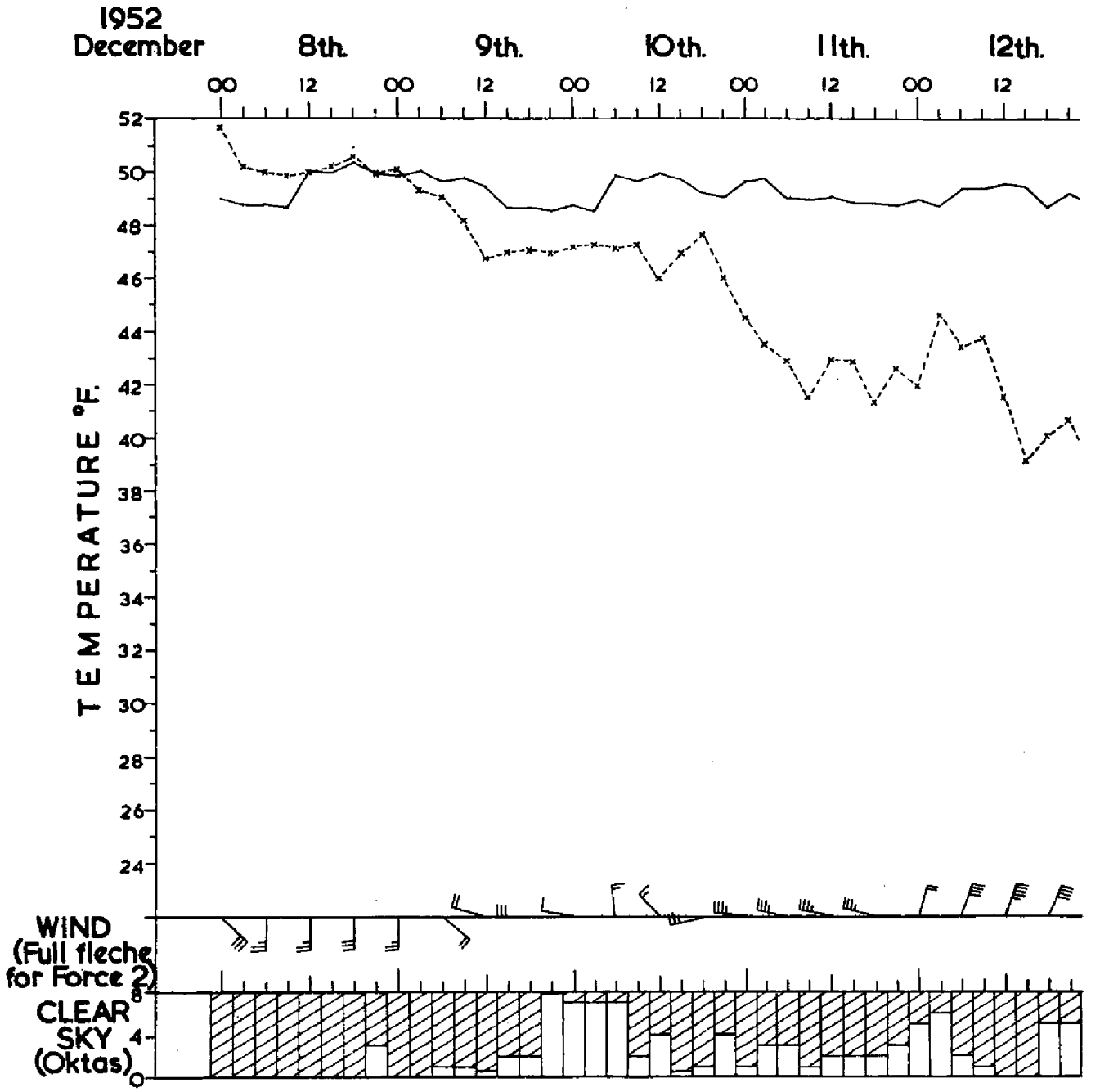
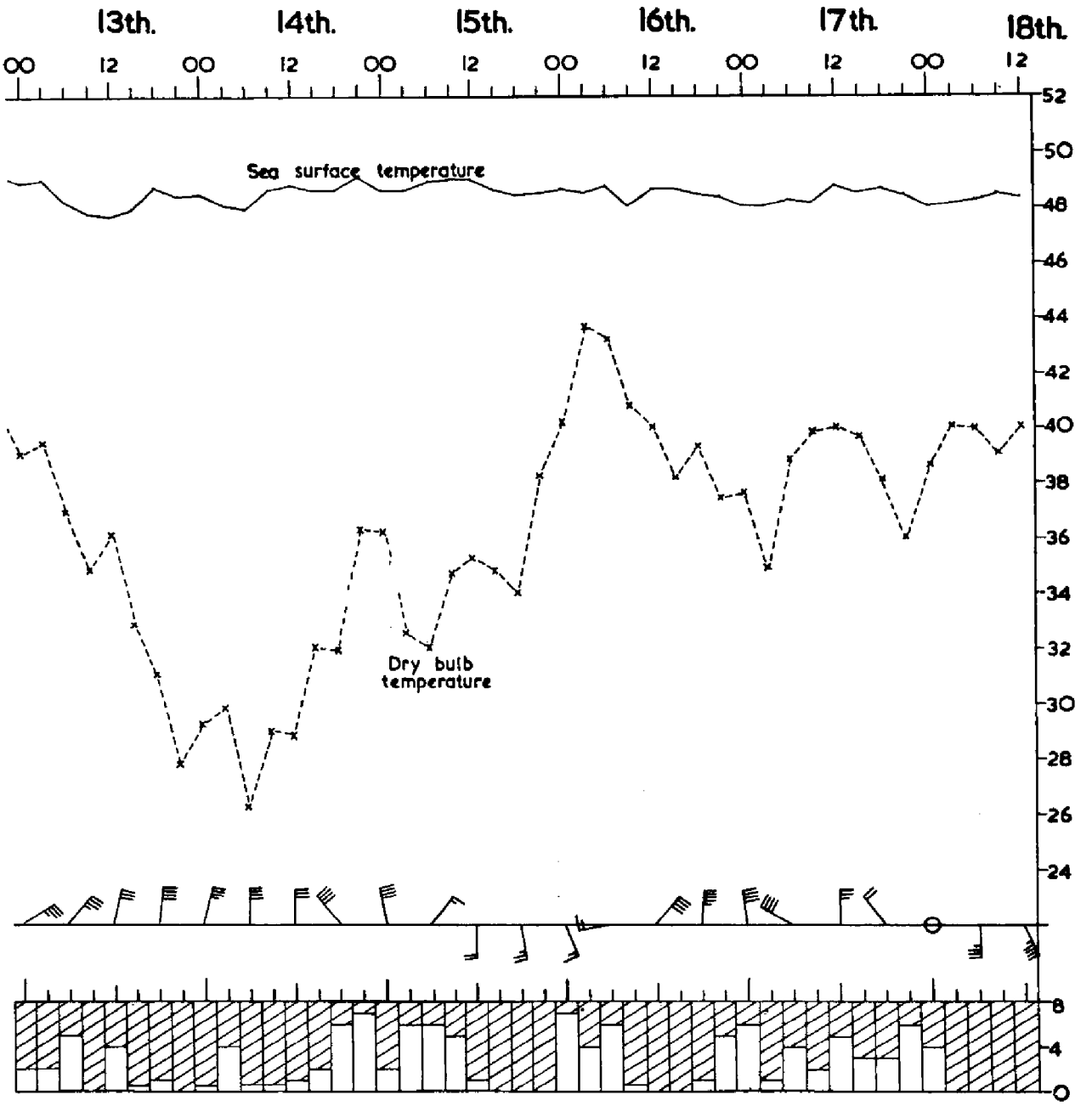


Fig. 2. Air temperature, sea temperature, wind and cloud observations

absolute humidity in the same layer. Further consideration will show that this condition is fulfilled in these three cases. In the Antarctic in autumn, and probably off the coasts of Greenland at this season, very cold air with a low moisture content often flows off the chilling continent on to a relatively warm sea. In the case discussed here the extreme air-sea temperature difference was $-22°$F and at Hong Kong $-25°$F. Strong winds accompanied the formation of frost smoke in each case, although they would not appear to be essential for its formation, since turbulence might be expected to retard the saturation of any layer near the surface. In the case of *Weather Explorer* at station "I," it has to be remembered that such an exceptional air-sea temperature difference as $-22°$F could neither be produced nor maintained there without the existence of N'ly winds around gale force. In this locality the strong winds help to maintain the large air-sea temperature difference and the strong advection process similarly helps to maintain a large absolute



made by *Weather Explorer* at station INDIA (61°N, 14°W), 8th-17th December, 1952.

humidity gradient in the lowest layers by constantly renewing the supply of dry Arctic air. Some information recently published by Darlington[4] supports the latter argument.

The formation of frost smoke clearly depends upon the vapour pressure gradient near the sea surface, the larger this gradient becomes the more likely is it that air near the sea surface will be saturated if the air is much colder than the sea. It can readily be shown from this reasoning that the conditions at 0400 G.M.T. on 14th December were as favourable as those known to exist on the coasts of the Antarctic in autumn. Taking as representative conditions for the Antarctic a screen air temperature of 0°F with relative humidity 50% and a sea surface temperature of 29°F, it follows that the vapour pressures in the air (assumed saturated) directly over the sea surface and at 4 ft above the surface are 5·3 and 0·7 mb respectively, giving a difference of 4·6 mb. When the *Weather Explorer* observed frost smoke,

air temperature was 27·0°F and wet bulb depression 2·0°F with a sea surface temperature of 48·0°F. The vapour pressures in the air over the sea surface and at the screen were therefore 11·4 and 3·6 mb, giving a difference of 7·8 mb between air at the sea surface and in the screen at the level of the ship's bridge. The vapour pressure gradients are thus of similar magnitude. In the case quoted by Starbuck, air temperature at Hong Kong was 44·0°F with a sea surface temperature of 69·0°F. No details of relative humidity are available. The vapour pressure in the air over the sea surface was 24·2 mb, and if we assume various relative humidities we find the screen vapour pressures were 9·8 mb for 100% R.H. and 5·8 mb for 60% R.H. The value of the difference cannot have been less than 14·4 mb and was probably around 18 mb, making conditions much more favourable for production of frost smoke than in the other two cases.

Montgomery has shown that in certain circumstances the rate of evaporation E is related to the vapour pressure e_w of the air directly above the sea surface, the vapour pressure of the air e_a a short distance above the sea (i.e. at bridge level on a ship) and the wind speed W by the expression $E = K\ (e_w - e_a)\ W$, where K is a constant.

The table below gives some computed values of E/K at *Weather Explorer* on this occasion which, although not absolute values, are comparable among themselves.

Date (Dec., 1952)	Time (G.M.T.)	Dry Bulb (°F)	Wet Bulb (°F)	Depression of wet bulb (°F)	e_a (mb)	Sea Temp. (°F)	e_w (mb)	$e_w - e_a$	W (metres sec)	$(e_w - e_a)W$
12th	12	41·6	40·0	1·6	7·7	49·6	12·1	4·4	23·5	101
	18	40·1	38·7	1·4	7·4	48·7	11·7	4·3	18·4	79
13th	00	39·0	37·9	1·1	7·3	48·9	11·8	4·5	16·4	74
	06	36·9	34·9	2·0	6·0	48·2	11·5	5·5	16·4	90
	12	36·1	33·1	3·0	5·0	47·7	11·3	6·3	13·3	84
	18	31·0	29·9	1·1	4·8	48·7	11·7	6·9	17·4	120
	21	27·8	27·4	0·4	4·9	48·4	11·6	6·7	12·8	86
14th	00	29·2*	29·0		5·2	48·5	11·6	6·4	15·4	98
	03	29·8*	26·5		3·7	48·1	11·4	7·7	14·3	110
	06	26·2	25·4	0·8	4·1	47·9	11·4	7·3	18·4	134
	09	29·0	28·2	0·8	4·8	48·6	11·6	6·8	17·9	122
	12	28·8	25·7	3·1	3·3	48·8	11·7	8·4	13·8	116
	15	32·0	26·8	5·2	2·7	48·6	11·6	8·9	15·4	136
	18	31·9	30·3	1·5	5·1	48·6	11·6	6·5	19·0	124
	21	36·3	32·0	4·3	4·2	49·1	11·8	7·6	19·4	147

*Aspirated.

The increase of the rate of evaporation early on the 14th is evident, although either the rate of evaporation depends on other factors, or the formation of frost smoke is influenced by something else, because the values in this table suggest that frost smoke was more likely to have occurred on the afternoon and evening of the 14th than at the time when it was observed. The maintenance of the large vapour pressure gradient through that afternoon is not readily explained until the trajectory of the surface air is taken into account; this shows that it originated W of Spitzbergen, whence it had travelled in the preceding 36 hours. It seems probable that the conditions for the formation of the frost smoke in this region are very critical, since although a strong wind is essential to maintain a steep vapour pressure gradient, the resulting vigorous vertical mixing is unfavourable for its formation. Perhaps frost smoke can only occur in temporary lulls of the wind, which are sufficient to give time for the production of a thin saturated layer before the destructive process of turbulence starts afresh. Unfortunately an anemometer record is not available.

During its rapid southwards passage this air warmed from −6°F when it left Spitzbergen at 1200 G.M.T. on the 12th, to 9°F at Jan Mayen at 1200 G.M.T. on the 13th (see Fig. 1), to 26°F at the *Weather Explorer* at 0600 G.M.T. on the 14th, a total rise of 32°. The temperature of the sea surface over which it had travelled from somewhere NE of Jan Mayen to the *Weather Explorer* rose some 19°, from 29° to

48°F. Evidently a large amount of heat was supplied to the lowest few thousand feet of the air by the sea although the change in sea surface temperature at *Weather Explorer* was very small. It seems virtually certain in the conditions of rough sea which prevailed, that this heat was provided by a considerable depth of sea. The fall of sea surface temperature at the time of arrival of the really cold air amounted at most to 1·9° (49·6° at 1200 G.M.T. on the 12th to 47·7° at 1200 G.M.T. on the 13th), and after that time sea surface temperatures showed a very slow rise amounting to

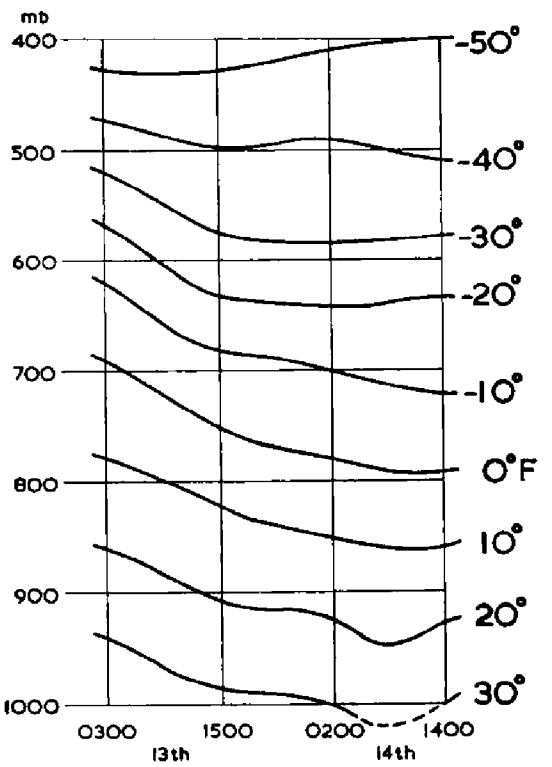


Fig. 3. Isopleths of dry bulb temperature (°F).

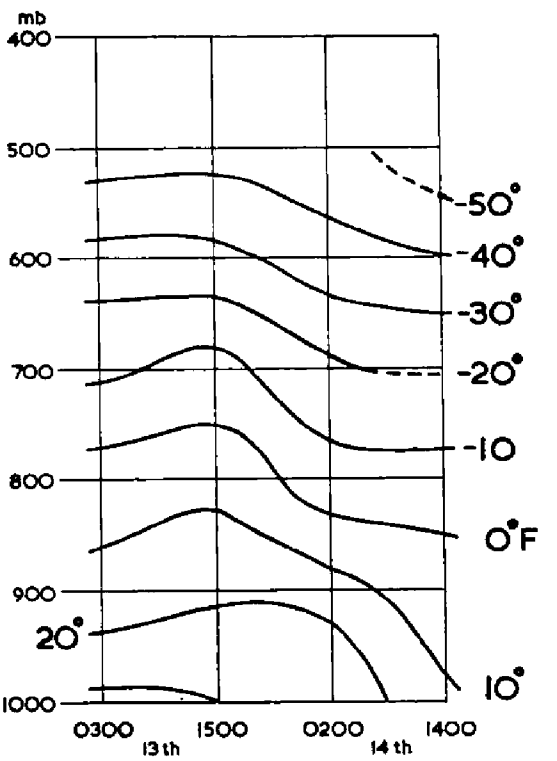


Fig. 4. Isopleths of dew point (°F).

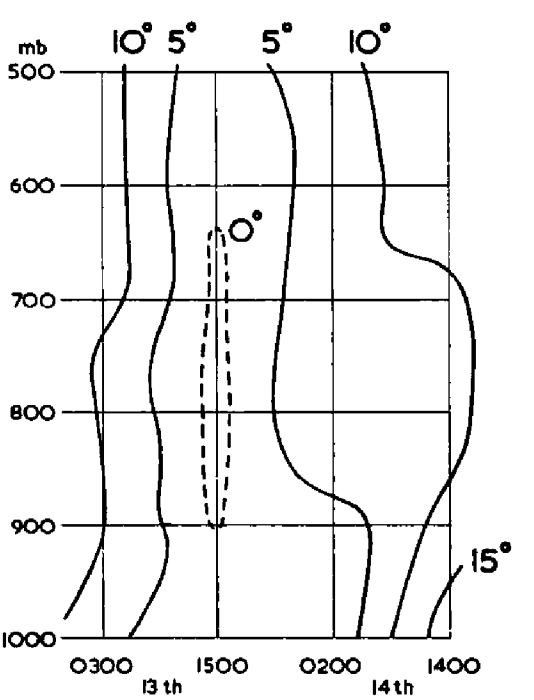


Fig. 5. Isopleths of dry bulb – dew point.

The readings in Figs. 3-5 were made at 60° 30'N, 14° 00'W, on 13th-14th December, 1952.

just over 1° through the next 48 hours. Throughout the 12th–15th the positions of *Weather Explorer* all lay within a circle of diameter 20 nautical miles. The variations of sea and air temperature are shown in Fig. 2, along with three-hourly observations for 8th–17th December, including winds and state of sky. It is possible that the changes of sea temperature here show some dependence on wind and cloud. For instance, the fall of sea temperature on the 9th while air temperature fell 3° is almost as large as during the time when on the 12th–13th air temperature fell through 9° and later fell a further 10°. On the 9th winds were mainly force 4 whereas on the 13th and 14th force 6 to 9 were recorded; there was little difference in the state of the sky between the two occasions.

Isopleths of dry bulb temperatures and dew point between 1000 mb and 400 mb (about 23,000 ft) have been drawn for *Weather Explorer* for the four ascents on the 13th and 14th and are shown in Figs. 3 and 4 respectively. The increase in moisture content at 1500 G.M.T. on the 13th is noticeable and may be connected with the more E'ly origin of the air below 700 mb at this time and its consequent longer passage over open water.

A striking feature is the arrival of drier air aloft (800–500 mb) early on the 14th. In the surface layers the moisture content was maintained until after 0200 G.M.T. on the 14th, presumably as a result of the vigorous evaporation and also because, as noted earlier, the air which reached *Weather Explorer* early on the 13th had travelled across the warmer Norwegian sea. These results are also shown in the isopleths of differences (dry bulb–dewpoint) in Fig. 5, which clearly show how the really dry air in the lowest 2,000 ft reached the ship on the afternoon of the 14th.

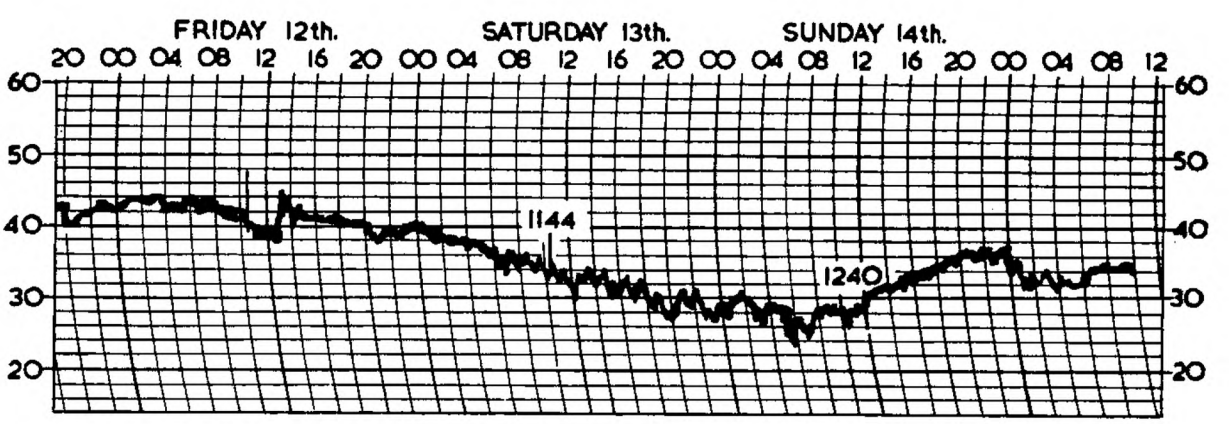


Fig. 6. Record of dry-bulb temperature on *Weather Explorer* at station INDIA, 8th-17th December, 1952.

The character of the thermograph trace on the 13th and 14th (Fig. 6) throws some light on the process of heating of the air by the sea. The frequent temperature fluctuations, in some cases nearly 5° within a few minutes and followed by a recovery which was usually more gradual, suggests a process in which a succession of large " bubbles " of air near the sea surface are carried downwind. Each large " bubble " is associated with a superadiabatic lapse rate, at least in its lowest layers, is of large horizontal extent (10–30 miles across) in comparison with its vertical thickness, and increases in size upwind for a certain distance to a point where it becomes large enough and buoyant enough to break away. At this point the colder air a short distance above is enabled to descend quickly to the surface in its rear, when the process begins again. The point at which a " bubble " ascends is determined by the time which has elapsed since its formation began, by the stability of the overlying air, by the wind speed and by irregularities in the sea surface temperature which would appear to exist (according to Fig. 2) even in these stormy conditions.

The whole process would appear rather similar to the first formation of globules of steam at the base of a kettle when the water is approaching boiling point, although the analogy must not be pressed too far since water in a kettle has little if any horizontal movement. Clearly all the bubbles of heated air at a sea surface which is more than 20° warmer than the air cannot all rise together through their environment when their rate of formation is so rapid, and chance factors such as those described will determine which bubbles first achieve a critical size which gives them a decisively larger buoyancy than that of their neighbours. Sutton[5] considers the loss of heat by forced convection from a heated smooth flat plate in a wind tunnel and comments on the fact that Pasquill found fair agreement for this case between theory and observation for the rate of loss of heat: " In this example which corresponds to the case of a high wind blowing over a smooth surface whose temperature does not differ greatly from that of the air stream . . . it is also clear that . . . buoyancy forces must have been at a low level compared with frictional forces." In the example described here it is likely that buoyancy forces were more significant in the lowest layers than frictional forces.

Conclusions

(*a*) The vapour pressure gradient in the lowest layers on this occasion was of similar magnitude to the gradient which prevails in the conditions when frost smoke has been observed in polar regions, and recently at Hong Kong.

(*b*) Use of Montgomery's relation shows that the rate of evaporation from the sea at *Weather Explorer* was higher than usual and became much greater on 14th December than on the previous day.

(*c*) The air-sea temperature difference observed by the *Weather Explorer* on this occasion was exceptionally large and was in fact associated with an outbreak of Arctic air from high latitudes, which gave the lowest value of 1000–500 mb thickness recorded at Jan Mayen in the past six years.

(*d*) In the 12 to 18 hours preceding the arrival of the coldest air at the ship, air temperature fluctuations became much more pronounced; variations up to 5°F within a few minutes occurred on several occasions. It is considered that this was a result of vigorous convection in which " bubbles " of heated air broke away every few minutes and were replaced by colder air from a slightly higher level.

References

[1]Simpson, G. C. *British Antarctic Expedition* 1910-13, *Meteorology*, Vol. I, p. 147. (Calcutta: Thacker, Spink & Co., 1919.)

[2]Wright, C. S., and Priestley, R. E. *British Antarctic Expedition* 1910-13, *Glaciology*, p. 24. (London: Harrison & Sons, 1922.)

[3]Starbuck, L. Arctic sea-smoke at Hong Kong. *Weather, London*, **8**, p. 77. (1953.)

[4]Darlington, C. R. The variation of humidity with height over the ocean. *Met. Res. Pap., London*, No. 725, S.C.III/28. Tables 1(*a*) and 1(*b*). (1952.)

[5]Sutton, O. G. *Atmospheric Turbulence*, p. 97. (London: Methuen, 1949.)

Navigation Today

An exhibition entitled " Navigation Today " was opened by Lord Waverley, Chairman of the Port of London Authority, at the Science Museum on 22nd April, 1953. The exhibition was organised by a small committee on which the Institute of Navigation played a prominent part, and it remained open until mid-September.

Navigation by sea, air and land had its place in this exhibition, the main purpose of which was to illustrate all aspects of modern navigational practice. Throughout the exhibition the navigator's problem was stressed as follows:

(*a*) to determine his position on the globe;

(*b*) to calculate the course he needs to steer.

The meteorological aspect of navigation both in the air and on the sea was illustrated with the aid of maps. For air navigation a series of charts was exhibited showing the principles of pressure-pattern flying and explaining how an aircraft by taking a devious route over the Atlantic and taking advantage of favourable winds at various heights, can perform a quicker passage than if it took the direct route; in this way it can save fuel and can carry more cargo or passengers. An ingenious illuminated diagram constructed of perspex, and showing mean wind arrows at various levels across the Atlantic up to about 50,000 ft, illustrated very clearly how the wind varies with increasing height.

The meteorological aspect of marine navigation was illustrated by a chart of the ocean currents in the China Sea, prepared by the Marine Branch of the Meteorological Office from observations sent in by selected ships, and there was a composite chart showing the wind roses for the month of July taken from the climatological atlases of the oceans. The practical value of the Atlantic bulletin to a ship's master was illustrated by some weather maps prepared aboard the *Roxburgh Castle*, showing how the master had rightly made a considerable alteration in course in order to avoid the unfavourable winds of a depression and took advantage of the favourable winds in its NW quadrant.

Throughout the exhibition it was shown that the various problems of the sea-going navigator had their counterpart in the air; the difference is that in aviation, owing to the much higher speeds involved, navigational problems need to be solved much quicker and electronic aids need to be more numerous.

It was a little surprising to find how much navigation is needed on land, e.g. in areas like the Antarctic where landmarks are almost non-existent. It was interesting to note that the land navigator, in addition to his compass, chronometer and sextant (or theodolite), also has his log in the form of a measuring wheel which works somewhat similarly to a speedometer.

A feature of the marine side of the exhibition was entitled " Raft Navigation ". This included a map showing some historic lifeboat voyages, including that of Captain Bligh and the epic voyage of the *Trevessa's* boat. A selection of charts and instruments that were made available to shipwrecked mariners and ditched airmen during the last war was also exhibited. The charts emphasised the value to such individuals of some elementary knowledge of the prevailing winds and currents in various parts of the world.

Navigation instruments of various types occupied a prominent part of the exhibition, and the electronic aids (including such methods as Gee, Loran, Consol and Decca, as well as the various uses of radar) were noteworthy. The layout of the bridge and wheelhouse of a modern liner was quite spectacular, and it was interesting to note both a mercurial and aneroid barometer were provided. The cockpit of a modern aircraft was also shown in detail. C. E. N. F.

The Association of Navigation Schools

The Association of Navigation Schools held its annual conference at Hull in May, 1953. Vice-Admiral Day, Hydrographer of the Navy, in an address to the Association pointed out the useful contribution which officers in merchant ships can make to the work of the Hydrographic Department. For this purpose he commended the use of Form H102, which is obtainable gratis from Admiralty Chart Agents. He mentioned in particular the desirability of receiving criticisms from ships' officers about design of existing charts and proposals for new ones, the supply of appropriate original foreign documents, suggestions as to new surveys which appeared to be desirable, the submission of accurate information whenever possible due to obvious changes which had occurred with regard to navigational aids, information about landmarks and particularly upon their usefulness for radar purposes and accurate information about soundings and observations of magnetic variations. The value of a line of soundings to prove or disprove the existence of an E.D. or P.D. shoal was mentioned. In his talk Admiral Day referred to the useful work which voluntary observers in merchant ships have been doing in co-operation with the Meteorological Office about surface current observations in the oceans. Admiral Day emphasised that masters and officers from merchant ships would always be very welcome visitors at the Hydrographic Office in Cricklewood.

In the discussion which followed the Hydrographer's paper, mention was made of the necessity of making an adequate allowance for leeway when calculating ocean currents, otherwise the resultant current would be a combined lee drift and current effect.

Captain Quick, the Principal Examiner of Masters and Mates, in presenting his annual address to the Conference, said that the introduction of a new syllabus did not appear to have had any marked adverse effect on the examination results—but that results for 1952 were nevertheless less satisfactory than in 1951. The percentage of candidates who had passed their examinations during the year, compared with 1951, were as follows:

	Masters	1st Mate	2nd Mate
1952	71·2%	76·2%	69·9%
1951	84·6%	84·0%	76·5%

He pointed out that the chief weakness of candidates was in the practical side of their chart work and navigation, but that their oral seamanship had generally improved, except with regard to boat work, which tended generally to be rather weak. An interesting point was the lessening in the number of candidates who had come up from the lower deck during the year, but Captain Quick stressed that those candidates of this category who had appeared before the examiners were generally pretty good at their work.

Mr. Richey, Secretary of the Institute of Navigation, drew the attention of the Conference to the investigations being undertaken by that Institute, with the co-operation of navigators at sea, to ascertain the accuracy of observations taken at sea under normal conditions, and asked navigation schools to give some publicity to this scheme.

An interesting talk upon preservation of fish in trawlers was given by Dr. C. L. Cutting, of the Humber Research Laboratory. He pointed out that owing to the recent restrictions on fishing imposed by Iceland, British trawlers had been forced to go further afield (e.g. Davis Strait) for their fishing. Research had shown that fish stowed in ice (32°F) could only keep really fresh for about 12 days. It was essential therefore to devise some economical and practicable method of preserving the fish aboard the trawler for a longer period and this seemed to imply the use of deep-freezing methods. Research into the problem was continuing, but it was inevitable that under present conditions a lot of fish landed at our ports by deep-sea trawlers was condemned for human consumption under present methods.

The importance of insulation of the ship's side of a trawler was illustrated by cases in which the fish temperature in a non-insulated hold rose to about 50° after a period of 18 days. At such a temperature spoilage is four times as rapid as it is at 32°.

The Humber Research Laboratory was thus doing all it could to solve this problem and to re-educate trawler officers and crews into the best method of preserving their catches under existing circumstances.

The meeting concluded with a showing of an under-water film taken in the Mediterranean with the co-operation of Admiralty frogmen, entitled *Trawls in Action*, and this clearly showed the action of a trawl as it was towed along the seabed.

C. E. N. F.

OBSERVATIONS OF WHALES FROM SHIPS

Report on the first year's observations

Dr. Mackintosh of the National Oceanographic Council has prepared a brief report concerning the results up to date of the observations which have been voluntarily sent in by the masters of British merchant ships to the National Institute of Oceanography about the distribution of whales in the various oceans. Forms for whale observations have been supplied to Port Meteorological Officers and they deliver these forms aboard any British merchant ship they visit if the master and officers are prepared to carry out the whale observations.

Dr. Mackintosh's comments are as follows:

" Up to the end of March, 1953, we had received reports from about 120 separate voyages.

" The number of observations from any one voyage varies considerably; some reporting no cetacea seen, some noting whales or dolphins on perhaps one occasion, but the majority giving a regular series of observations or daily notes in which the presence or absence of whales is noted. All these are helpful but the series of day-to-day records are, of course, best.

" The largest number of observations, i.e. the largest number of voyages, are across the North Atlantic, though there are few yet from the higher latitudes. From a large part of the North Atlantic we are beginning to get a picture of the general distribution of whales. They are evidently fairly scattered (this is among the things we want to know), but more observations will be needed before we have grounds for comparing the numbers of whales present at different times of the year.

" Reports from the South Atlantic and Indian Ocean are also likely to be of considerable interest, although these accumulate rather more slowly. Eventually, however, they will be of at least as much value as those from the North Atlantic. It is hoped that ships sailing off the beaten tracks will keep day-to-day observations, even if these observations are negative.

" Records of small whales and dolphins are giving results of real scientific value. It is clear that there are definite areas of distinct concentration. We are dealing with a vast area of ocean, and it is necessary to be cautious in drawing conclusions until ample data are available. However, we hope to publish some preliminary notes before long.

" The National Institute of Oceanography is most grateful for the co-operation of observers and the many carefully compiled records received. We hope that these observations will be continued and extended for some time yet."

CORONATION REVIEW OF THE FLEET

The British ocean weather ship *Weather Explorer* (Commander H. R. Wilkinson, R.N.R.) had the honour of being present at the Coronation Review of the Fleet by Her Majesty the Queen at Spithead. *Weather Explorer* left ocean station " Juliett " (52° 30'N, 20°W) on 6th June and, having called at Plymouth to paint ship for the occasion and refuel, arrived in the review area on 14th June. *Weather Explorer* was allocated a berth about ½ mile NE of Ryde Pier, her nearest neighbour being the Brazilian warship *Almirante Barroso.* Those who were aboard the ship for this memorable occasion had an excellent view of the proceedings.

The following " selected ships " were also present:

Amsterdam (British Railways)
Andes (Royal Mail Line)
Captain Cook (New Zealand Government Transport, operated by Donaldson Atlantic Line Ltd.)
Clan Shaw (Clan Line)
Dilwara (Ministry of Transport, operated by British India Steam Navigation Co. Ltd.)
Empire Windrush (Ministry of Transport, operated by New Zealand Shipping Co. Ltd.)
Ernest Holt (Ministry of Agriculture and Fisheries, research trawler)
Hildebrand (Booth Line)
Interpreter (Harrison Line)
Samaria (Cunard Line)
St. Briavels (South American Saint Line Ltd.)
Velletia (Anglo-Saxon Petroleum Co. Ltd.)

On this royal occasion the weather behaved relatively kindly; there was a fresh, somewhat squally, w'ly breeze which caused some discomfort to yachts and small craft. The sky had a tendency to be overcast but the sun did at times appear and cloud level did not fall low enough to preclude a good view of the fly-past of the naval aircraft during the afternoon. The surface visibility was excellent, so that one could see the whole extent of the vessels present, and even in broad daylight the prominent flame which seems to burn eternally at the Fawley Oil Refinery showed up like a great gold flag against the skyline. The fresh breeze was advantageous as it effectively showed off the flags with which every ship was dressed overall.

The Review itself has been adequately described in numerous other publications. It was indeed an impressive sight, and all the arrangements were carried out with the meticulous attention to detail which one expects from the Royal Navy, and as far as can be judged everything went according to plan. The switching on of the illuminations aboard every warship, both British and foreign, for example, occurred almost as though it had been done with one switch. C. E. N. F.

Letter to the Editor

SIR,—I thank you very much for your letter informing me that I have again been awarded an " Excellent Award " as a voluntary marine observer for my work during the year ending 31st March, 1953. This is indeed an additional memento for me to treasure now that I have swallowed the anchor after 41 years with the Port Line and seven years in sail, as I am due to retire on 1st August, 1953.

It has always been a pleasure to keep an eye on the young officers and teach them how important the weather reports are, or anything that may be of interest such

as exceptional currents, sunsets, extraordinary cloud formations, etc., and I am very sorry it has all come to an end. I have been an observer now for many years, in fact I have left on board my last ship, the *Port Brisbane*, some of the wind and current charts I was awarded while serving as the Chief Officer of the *Port Augusta* soon after the 1914–18 War.

I wish you every success, and trust that the Port Line ships will continue their good work.

M.V. *Port Brisbane.* H. STEELE, O.B.E.

Book Reviews

The Sea Coast. By J. A. Steers. *The new naturalist. A survey of British natural history.* $8\frac{3}{4}$ in. × 6 in. pp. xi + 276. *Illus.* Collins, London, 1953. 25*s.*

The author's aim in this book is mainly to give the fullest possible account in plain language of the past evolution and present features of the whole coastline of Great Britain, for the benefit of the layman and the information of those authorities directly responsible for coastal preservation and development. Although most of the subjects described do not directly concern the mariner and navigator, the greater part contains very useful information on coastal features which can be related to such problems as the appearance of coastlines on a ship's radar screen, the accuracy of soundings over various types of sea floor relief, and the interpretation of coastal and shallow water features upon Admiralty charts.

The first four chapters deal chiefly with the profile and plan of the coast, erosion and accretion and the movements of beach material. Subsequently the author deals fully with cliff scenery, major shingle structures and studies in the evolution of the coastal scenery, e.g. the silting of harbours and river mouths. He finishes with a long chapter in which the main features of nearly all sections of the coastline of Great Britain are described in relation to their geological structure and to the forces of nature which have worked upon them as shown in the earlier chapters. Of great interest to seamen and oceanographers is the detailed description of the submarine features around Britain given in Chapter 8. The author shows how these are related with the different phases of the Ice Age, and with river systems long since submerged under the waters overlying the continental shelf, English Channel and North Channel.

A valuable section of the book is devoted to the movement of beach material, informative descriptions being given of " destructive " and " constructive " waves and the effects they produce on various types of coastline. Here also the author draws upon his intimate knowledge of these islands to describe in detail the formation of cliffs, wave platforms and raised beaches in many localities. For those interested there is a great deal of information on the erosion of coastlines by tidal and storm effects and about floods on the east coast. The book was published shortly before the disastrous floods of February, 1953, so that most emphasis is laid upon the circumstances which caused the floods in January, 1928, in the Thames Estuary. His conclusion that a very slow land subsidence has been in progress in south-east England at least since Roman times, while not intended to overstate the case, at least points a warning to authorities in charge of coastal defence which the subsequent event has fully justified.

Minor criticisms are inevitable, in particular a lack of relationship between the positions of illustrations and the text is evident. There seems to be no reference to Plate 8 in the text, nor does the island of Foula (in Shetland) with its magnificent cliffs receive any mention in a description devoted to the remote islands of Scotland. The book is illustrated with excellent photographs, including several aerial views, and is completed by a serviceable index and bibliography. R. F. M. H.

Climate and the British Scene. By Gordon Manley. *The New Naturalist. A survey of British natural history.* $8\frac{3}{4}$ in. × 6 in. pp. xviii + 314. *Illus.* Collins, London, 1952. 25*s.*

To relate the many aspects of climatology to the British scene and way of life is not a task many would undertake with confidence. Professor Manley has achieved this task beyond what must have been the expectations of most who first take up the book. Professor Manley shows in this book not only his vast knowledge of climatology, of which we know already, but also his keen study of many aspects of the British scene, life, history and literature, and has obviously given great thought in relating these characteristics to climate.

The book includes a chapter on the history of climatic records, one on properties of the atmosphere, and in Chapter 4, on the atmosphere circulation, Professor Manley discusses the dependence of climate on the character of the various air masses reaching Britain. The author then goes on to describe the climate during the seasons, followed by two chapters entitled " Landscape features and their effect on weather " and one " Mountain and Moorlands—the effect of Altitude ". Then come chapters entitled " Snowfall and snow cover ", " Secular Variation of the British Climate ", " Instrumental Records: The Range of Climatic Behaviour " and " Climate and Man ".

Professor Manley discusses in detail the effect of topography and altitude on climate and the discussions on effect of climate on agricultural development are amongst the most interesting in the book.

No specialised knowledge of meteorology is required to fully appreciate the book, yet no meteorologist who reads it can fail to acquire new viewpoints of the relationships between climate and British scenery and life.

The book is well produced and there are few errors. The plates, many of which are coloured, must afford great pleasure to all and are of definite aid in the full appreciation of many of the points Professor Manley discusses in the text. A considerable number of diagrams and climatological tables are included, but nowhere do they make the book less readable—on the contrary they are of benefit in emphasising many points in the text.

This book at 25*s.* is excellent value and Professor Manley and the publishers are to be congratulated on producing a book which must, for many years to come, be a standard work on the relationship between climate and life and scenery in this country.

P. R. B.

Astronomy for Everyman. Edited by Dr. Martin Davidson. $7\frac{1}{2}$ in. × 5 in. pp. xviii + 494. *Illus.* J. M. Dent & Sons, Ltd. 18*s.*

When the present reviewer became interested in astronomy, at about the beginning of this century, the physical universe was believed to contain about 100 million stars, our sun being one of these, and several thousand patches of faint light, known as nebulae, a few of the brighter of which had been proved by the spectroscope to consist of glowing gas. The star nearest to the sun, α Centauri, was known to be $4\frac{1}{4}$ light-years distant, a light-year being the distance light travels in one year, and so forming a convenient abbreviation for a distance of some 6 million million miles. It was also known that other bright stars were at various distances up to 1,000 light-years or more, and it was surmised that the faintest stars visible, including those forming the Milky Way, were much farther away.

The picture is very different now. The group of stars of which the sun is a member is estimated to consist of some 100,000 million individuals, known as the Galactic System, covering in one direction a length of about 100,000 light-years. But the most remarkable advance, made about 25 years ago, was the final confirmation of the theory that the majority of the nebulae are not masses of gas within the confines of the Galactic System, but are independent star systems of the same

kind as the Galactic System and comparable with it in size, though mostly rather smaller. These are scattered through space out to inconceivable distances.

The extent to which the universe can be explored has been very much increased by the great modern reflecting telescopes, of which that on Mt. Palomar, California, with a mirror of over 18 ft in diameter, is the latest and largest. No human eye will ever see the more distant of the star systems; only the photographic plate, exposed for periods up to several hours, can detect them. It is estimated that the Palomar photographs will show these objects up to a radius of 1,000 million light-years in every direction, to a total number of perhaps 800 million systems of stars, or of material forming into stars.

With the rapid advance of astronomical knowledge, and of new methods of observation and enquiry, the science has grown into a great number of separate fields of specialist research, and it becomes more and more difficult for anyone to keep pace with its continual development. The task of presenting in considerable detail a balanced view of the whole subject in a popular form for the ordinary reader is therefore one of real difficulty. In the volume under review this has been met by the collaboration of 12 authors, all of whom are well-known astronomers, whose interests lie in different branches of the subject. The whole is edited by Dr. Davidson, a past President of the British Astronomical Association, who contributes an introduction giving a general outlook over the universe as a whole before its various aspects are considered in the book.

This comprehensive volume of nearly 500 pages can be strongly recommended. It is clearly written without the use of mathematics, which occur only in the chapter on navigation and in a few footnotes and appendices. It can thus be read by anyone, with or without previous astronomical knowledge, and it is well illustrated with over 200 drawings and photographs. In addition to the chapters dealing with the solar system and the stars and nebulae, it includes others on the aurora and zodiacal light, light and instruments, navigation, and an excellent one on the history of astronomy from the earliest times. The new subjects of radio astronomy and interplanetary travel are also included. The book should stimulate interest in astronomy and may well induce many readers to try to see some of the wonders of the heavens for themselves. E. W. B.

The Ocean River. By H. Chapin and F. G. Walton Smith. $8\frac{3}{4}$ in. × $5\frac{3}{4}$ in. pp. x + 325. *Illus.* Victor Gollancz, Ltd. London, 1953. 16*s.*

This is a fascinating book, the product of two American authors, one a historian and anthropologist and the other an oceanographer and marine biologist. The ocean river is the Gulf Stream and the central theme of the book is the part that this current, and the whole current circulation of the North Atlantic Ocean, has played in the development of the nations and communities inhabiting its shores. It is quite impossible, within the limits of a short review, to give an adequate account of this most readable and interesting book, and one is lost in admiration at the amount of information assembled within its covers and the breadth of outlook displayed in its presentation. All that can be done is to give some indication of its scope.

Early in the book the whole geological history of the earth is summarised from the time when it was in a semi-molten state and when the moon was conjectured to have split away, leaving a great void, part of which still remains as the Pacific Ocean basin. All the theories of the evolution of the continents and oceans to their present form are examined and the probable forerunners of the Gulf Stream in earlier forms of the North Atlantic are indicated. The whole development of life on earth is next considered and, later on, the great changes of climate and weather which have occurred in the more recent geological epochs are dealt with in relation to the welfare and expansion of man.

The ancient fear of the unknown Oceanus and the legends attached to it are described, and a whole chapter is devoted to the legend of the lost continent of Atlantis. The history of the gradual exploration of the North Atlantic is given also the story of the rivalry of the nations for power and commercial development. The evolution of fishes is considered and the importance of the Atlantic fisheries as a source of food and as affecting the pattern of the exploration and settlement of North America is brought out.

Other subjects dealt with are the discovery and charting of the Atlantic currents, the development of navigation, the rivalries of Britain and America in the eras of sail and steam, the growth of scientific knowledge about the currents and the evolution of the modern science of oceanography.

In the last chapter the present and future state of development of western man is considered in its economic and other aspects, and it is shown that the Atlantic community is still in the process of integration into a more complete organic whole.

There are a number of interesting illustrations, including a geological time-chart, ancient world maps, old current charts, early forms of ships and old pictures of the Newfoundland cod-fishery. End-papers give a current chart of the North Atlantic.

E. W. B.

Journey into Wonder. By N. J. Berril, F.R.S. 8 in. × 5¼ in. pp. 320. Victor Gollancz Ltd. London, 1953. 13*s.* 6*d.*

This, a readable and unusual book, is written by an eminent naturalist and marine biologist who also shows himself to be a master of the English language. Our eyes are opened as to the natural history of the great voyages from Columbus to Shackleton, and the natural history is not only that of the ocean—linked with a considerable leavening of meteorology—but it also takes the voyager up some of the great rivers of the world, to the centre of Patagonia, to the continent of Antarctica, and to many interesting islands, among which the Galapagos occupy a place of honour. The characters are thus not only the voyagers themselves but also the birds, fishes and animals that are encountered.

The book opens appropriately enough with Columbus, and the author finds time to tear himself away from his natural history to discuss something of the character of this great seaman. Elizabethan adventurers Drake and Hawkins rightly have their places in this book, and then the great figure of Dampier—buccaneer and naturalist, and perhaps the first maritime meteorologist—strides across the pages. Dampier's famous book *Discourse of the Trade Winds, Breezes, Storms . . . throughout the World* is referred to with admiration and we learn that Dampier's interest in all aspects of nature, whether of animals, birds, fish or the sea itself, was seemingly inexhaustible, and he took considerable care to record all he saw. The author describes Dampier as " the most amazing naturalist of all time . . . of sailing for years without privacy in the company of buccaneers, and succeeded in observing and recording wind strength and direction to the extent of putting it together in his mind . . . ". Georg Forster, who accompanied Cook on his first voyage, appears next, and Cook himself is the central character of several chapters. Humboldt—made immortal by the current which bears his name—who had been inspired by Forster, is the next central character in this book, and then we move on to the memorable voyage of Darwin and Captain Fitzroy in the *Beagle*, in which Darwin acquired his inspiration for his *Origin of Species*.

The Antarctic—the last great stronghold to yield its secrets—comes late in the book, and Scott and Shackleton rightly find their place of honour there. But the principal character of the Antarctic is surely the emperor penguin, the search for whose eggs for scientific investigation was immortalised in *The Worst Journey in the World*, by Cherry Garrard.

Eggs, fish, birds, beasts and men all find their place, and as the plot unfolds and more of the world becomes discovered, we see how much we can learn of the prehistoric world from the study of such widely scattered subjects as the giant tortoise of the Galapagos Islands, the penguins of the Antarctic, the ostrich and the whale, and we note with humility how man's entry into the natural picture not infrequently spoils it. Thus, Guadalupe Island was an island paradise, but man's introduction of goats to provide a meat supply for whalers spoiled it all: " now nothing remains of an enchanting isle except barren and desolate ground . . . ".

With all its wealth of scientific fact there is found time to discuss the characters of the men who made the voyages, and their navigational problems. Anybody who is interested in the sea and in nature could not fail to be interested and to gain something from this admirable book. C. E. N. F.

Personalities

RETIREMENT.—CAPTAIN H. G. WHITTLE, O.B.E., until recently in command of the Royal Mail Lines M.V. *Highland Monarch*, has retired from the sea after 38 years' service with the Company. He received his first command in 1940 in the *Pardo*, which ship was sunk by enemy mine in the Thames Estuary that year. During the war Captain Whittle commanded a number of other vessels, and in the 1945 Birthday Honours List he was awarded the O.B.E. for his war service. Since the war he has been in the *Loch Garth*, *Highland Brigade*, *Asturias* and *Highland Monarch*.

Our first record of Captain Whittle as a voluntary observer was in 1920, when he was third officer of the *Avon*. Since that date we have received 48 meteorological logbooks under his name, of which 18 have been classed as excellent. In 1952 he was presented with a barograph by the Director for his long series of ocean weather observations.

We wish him health and happiness in his retirement. C. H. W.

RETIREMENT.—In April, 1953, CAPTAIN A. V. RICHARDSON, O.B.E., retired from the service of the Shaw Savill & Albion Line on reaching retiring age. He first went to sea in 1903 as an apprentice in a square-rigged ship. In 1911 he obtained his master's certificate, and he joined the Australian Commonwealth Line in 1914, being promoted to his first command in 1916. When the Shaw Savill Line took over the management of the Australian Commonwealth Line in 1928 he was in command of the *Fordsdale*, and he subsequently commanded several other vessels including the *Largs Bay*, which was badly damaged by mines during the war. Since the war he has been in command of the *Empire Kinsman*, the *Ceramic* and finally the *Gothic*, to which ship he was appointed in 1951 for the intended Royal Tour, that had to be cancelled because of the death of King George VI.

In the 1953 Coronation Honours List Captain Richardson was awarded the O.B.E.

A number of vessels under Captain Richardson's command were at times on the list of voluntary observers for the Meteorological Office; since 1928 a total of 11 logbooks have been received bearing his name.

The Meteorological Office wishes him health and happiness in his retirement.

C. H. W.

Southern Ice Reports

During the year 1952

Date	Position		Description
	Lat.	Long.	
	° ′	° ′	

OCTOBER

M.V. *Southern Atlantic*

23	48 58S	34 50W	Large echo on radar screen, believed to be large berg.
	49 09S	35 00W	1 small berg, several growlers.
	49 12S	35 07W	Fairly large berg.
	49 40S	34 40W	Medium echo on radar screen, possibly fairly large berg.

NOVEMBER

M.V. *Southern Atlantic*

1	53 42S	36 27W	1 small berg, 1 bergy bit.

DECEMBER

S.S. *Southern Garden*

12	54 36S	30 36W	2 bergs.
13	54 46S	28 46W	1 berg.
	54 42S	25 54W	2 bergs.
14	54 50S	21 18W	4 bergs.
	54 40S	19 47W	2 bergs.
	55 00S	17 57W	1 berg.
15	55 08S	12 00W	1 berg.
16	54 55S	05 53W	3 bergs.
17	54 49S	01 12W	1 bergy bit.
	54 47S	00 30E	3 bergs.
18	54 43S	03 32E	8 bergs, numerous growlers and loose ice.
	54 43S	04 59E	2 bergs.
19	55 08S	09 23E	7 bergs, several bergy bits.
	55 08S	10 49E	6 bergs, several bergy bits.
	55 28S	12 40E	5 bergs, numerous growlers.
20	56 00S	14 06E	7 bergs, 3 small strips pack ice.
	56 18S	15 11E	4 small bergs.
	56 50S	16 15E	12 bergs, numerous growlers.
	57 16S	17 32E	14 bergs, numerous growlers and bergy bits.
21	57 47S	18 57E	8 bergs, numerous growlers and bergy bits.
	58 12S	20 10E	9 bergs, numerous growlers.
	58 20S	21 12E	11 bergs, numerous growlers. Pack ice.
	58 24S	22 40E	6 bergs, numerous growlers.
22	58 24S	23 35E	8 bergs, numerous growlers and bergy bits.
	58 24S	24 38E	5 bergs, numerous growlers and bergy bits.
	58 32S	25 41E	12 bergs, numerous growlers and bergy bits.
	58 38S	26 50E	10 bergs, numerous growlers and bergy bits.
23	58 45S	28 09E	6 bergs, numerous growlers.
	59 10S	31 00E	7 bergs, several bergy bits and growlers.
	59 18S	32 32E	1 berg.
24	59 25S	33 51E	5 bergs, several bergy bits.
	59 31S	35 00E	3 bergs, several bergy bits.
	59 39S	36 20E	No ice.
25	59 51S	38 47E	No ice.
	59 55S	39 34E	No ice.
	59 58S	39 38E	1 berg.
26	60 06S	43 12E	No ice.
	60 35S	45 42E	2 bergs.
	60 35S	46 58E	2 bergs.
27	60 35S	48 55E	1 berg.
	60 35S	50 20E	No ice.
	60 36S	51 17E	No ice.
	60 37S	52 29E	2 bergs.
28	60 45S	54 00E	3 bergs.
	61 09S	57 05E	No ice.
	61 56S	58 30E	No ice.
29	62 10S	59 36E	3 bergs, several growlers.
31	65 28S	61 17E	No ice.

S.S. *Southern Harvester*

11	58 26S	14 10W	Pack ice, 2 small bergs.
13	57 34S	12 33W	Small slush ice, numerous small bergs, 2 medium bergs.
15	57 33S	12 19W	Small slush ice with frequent small heavy ice. 3 small bergs.
16	57 48S	08 00W	Small pack of brash ice. 2 small bergs, few bergy bits.
17	57 48S	07 04W	Medium pack of young ice, 2 small bergs, numerous bergy bits.
18	57 30S	06 41W	Approx. 80 bergs of different sizes. Numerous bergy bits all round. Large pack ice.
19	57 15S	11 19W	5 medium size bergs.
20	58 20S	13 13W	1 small berg. Medium size pack of brash ice with small heavy ice intermingled.
22	57 52S	15 59W	1 medium berg, 2 large bergs. Medium size pack of brash ice.
23	57 42S	15 36W	2 small packs of slush ice. 1 medium pack of brash ice.
24	57 18S	15 00W	Medium size pack of brash ice.
26	58 18S	15 12W	5 medium size bergs. Few bergy bits. Large pack of brash ice behind open drift ice.
29	58 01S	08 36W	2 medium size bergs. Few bergy bits. Pack of brash ice behind open drift ice.
30	57 38S	04 09W	11 bergs with few bergy bits.

S.S. *Thule*

28	63 45S	80 15E	Pack ice, strips and fields, going E-ESE in the E'ly direction and SW in the W'ly direction. The ice was heavy to go through by steamers. 10 bergs.
29	62 00S	87 10E	Strips of heavy ice in direction NE-SW, but with clear waters between the strips.
	61 45S	90 18E	32 bergs, the largest being 1-2 miles long and 158 ft. high. Few strips of small ice lumps.

Reports of ice for October, November and December, 1951, will be found in *The Marine Observer*, Vol. XXII, No. 158, p. 226.

Notices to Marine Observers

Postal Arrangements

The quarterly numbers of *The Marine Observer* are published on the last Wednesdays of December, March, June and September.

The Marine Observer is addressed to the Captain, S.S./M.V. ....., c/o the owners, and captains are requested to make their own arrangements for forwarding.

Shipowners, Marine Superintendents and all concerned in the despatch of mails to ships are asked to kindly facilitate the despatch and delivery of mail received at their offices from the Meteorological Office and "Air Publications and Forms Stores" to their ships abroad. Addressed to the captains of ships, this contains information required for the conduct of meteorological work at sea, and is most effective if received by the captains at the earliest possible date.

Ice Observation

Drifting ice, derelicts and other floating dangers to navigation are reported by all means of communication at the disposal of the master.

See Chapter 12, pages 96–98 of the *Marine Observer's Handbook*, Seventh Edition.

It is also desirable that more detailed information than can be given in a TTT wireless message should be available to the Meteorological Office for the purpose of research, and for Admiralty Charts and Sailing Directions.

Marine observers will greatly assist by noting the conditions of ice, either drifting or fast, in the pages provided at the end of the logbook (Form 911), or on Form 912, which may be supplied to the captain of any British ship on application to a Port Meteorological Officer or Merchant Navy Agent.

Observing ships using the Trans-North Atlantic tracks are requested to record not only when ice is encountered, but also when they have passed through the ice region during the ice season without encountering ice. In this case a " nil " report should be returned, since it is desirable as far as possible to determine when tracks have been clear of ice.

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ERRATA

In the article entitled "The *Cutty Sark*" which appeared on page 149 of *The Marine Observer*, July, 1953, the ship *Otago* was referred to as the first command of Joseph Conrad. This is incorrect. Conrad's command was the iron barque of the same name. C. H. W.

We have been informed by Dr. J. N. Carruthers of the National Institute of Oceanography that the figure of 5,906 fathoms, stated on page 70 of the April 1953 *Marine Observer* to be the deepest known depth in the ocean, should be 5,940 fathoms (see p. 217).

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